The DENTAL DIGEST

September
1932

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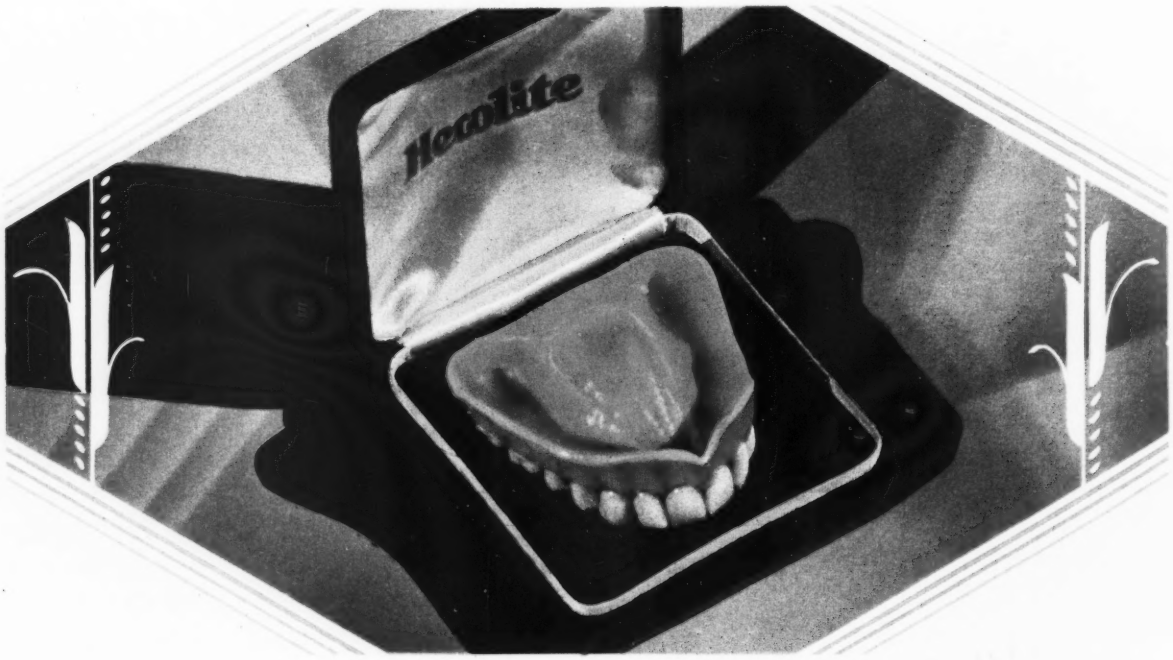

YOU DON'T EXPERIMENT WHEN YOU USE HECOLITE

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A SIMPLE TECHNIQUE FOR THE REMOVAL OF AN IMPACTED MANDIBULAR THIRD MOLAR

M. HILLEL FELDMAN, D.D.S.
New York

IN order to gain direct lifting access to a mandibular third molar it is necessary to remove a certain amount of bone at such points as will free the tooth from the bone crypt. These points are definite, and vary only a little. One has to operate in the area near the second molar and in the region just over the cemental portion of the tooth.

I have reference in this article to a mesio-angular impaction, according to the George Winter classification, in which the crown of the impacted third molar is directed at a mesial angle against the distal aspect of the second molar.

In the technique described here the need for surgery of the bone in the region enveloping the root aspect of the third molar is eliminated. In its stead, there are two main stages: (1) the removal of bone directly overlying the crown, and (2) the sectioning of the crown from the root portion preliminary to the application of lifting force to the root of the tooth. The successive steps of the technique are given with the accompanying diagrammatic illustrations.

The roentgenogram in Fig. A shows a preoperative view of an impacted mandibular third molar. The technique shown in the drawings directly describes the operation in this case. In these illustrations, Doctor Herbert S. Silvers, of Columbia University, has endeavored to follow my procedure in the operation by actual observation at the chair.

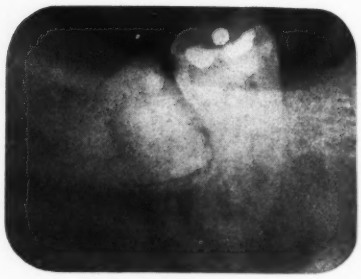

Fig. A—Preoperative view of the mesio-angular impacted mandibular third molar removed according to the technique described in this article.

Fig. 1 (Step 1)—The line of incision is shown in the mucoperiosteum overlying the tooth to be removed. The blade used is of the Williger type. The incision follows a line extending bucally as it passes distally from the posterior aspect of the second molar and downward alongside the buccal aspect of the second molar toward the mucobuccal fold.

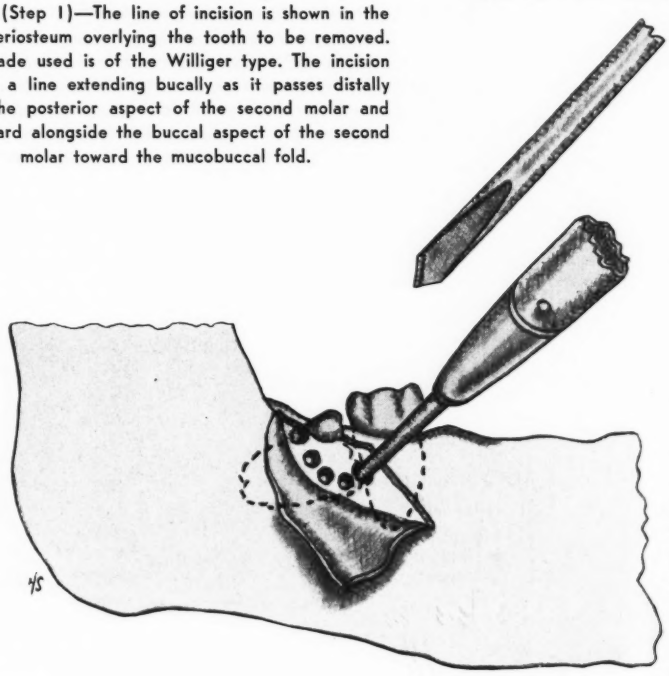

Fig. 2 (Step 2)—The mucoperiosteum is then reflected from the bone. While it is held away from the bone with a retractor or any suitable instrument, the engine drill, which I have designed, is directed into the bone over the crown of the impacted molar. In order to prevent overheating of the bone, the drill is inserted and reintroduced directly alongside. This is continued until the crown is encircled. The drilled openings are closely contiguous to one another.

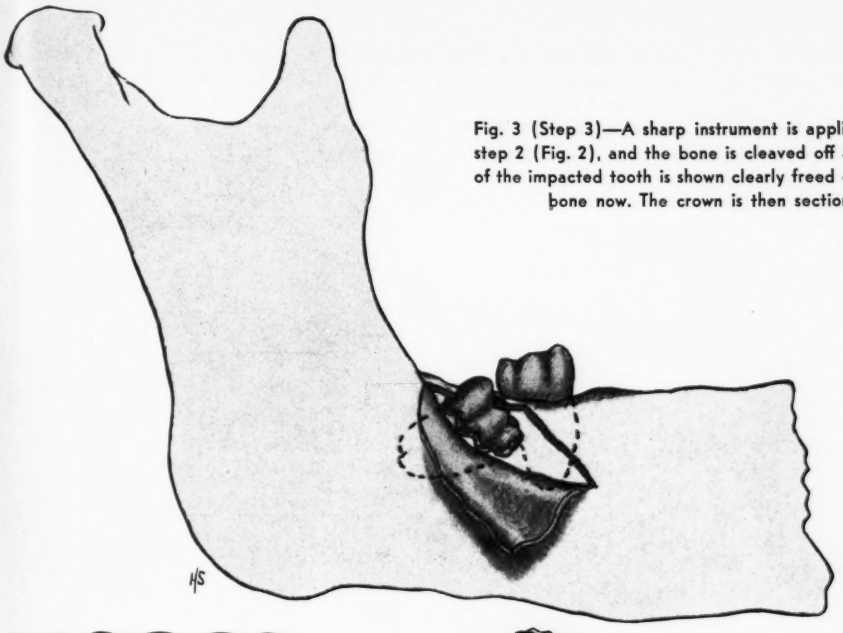

Fig. 3 (Step 3)—A sharp instrument is applied to one of the openings made in step 2 (Fig. 2), and the bone is cleaved off and away from the crown. The crown of the impacted tooth is shown clearly freed of bone. Only the root is covered by bone now. The crown is then sectioned from the root (Fig. 4).

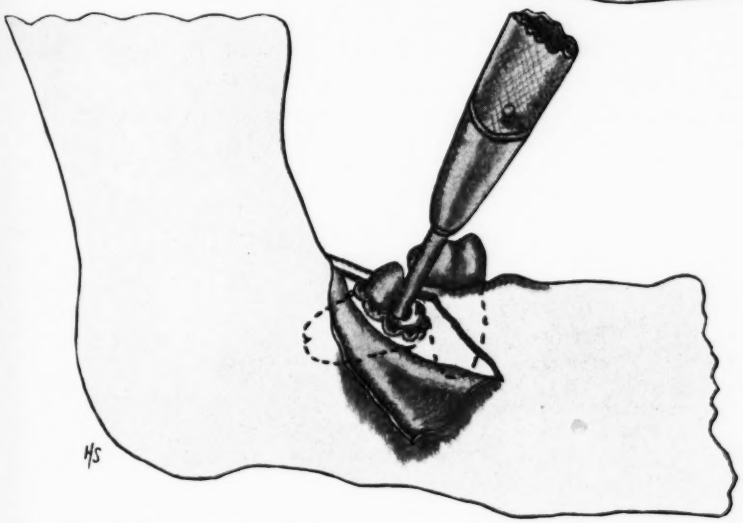

Fig. 4 (Step 4)—A small mounted stone is used to cut a depression in the enamel. Into this depression the drill is directed through the dentin. The drill is moved around within the tooth so that the crown is satisfactorily undermined.

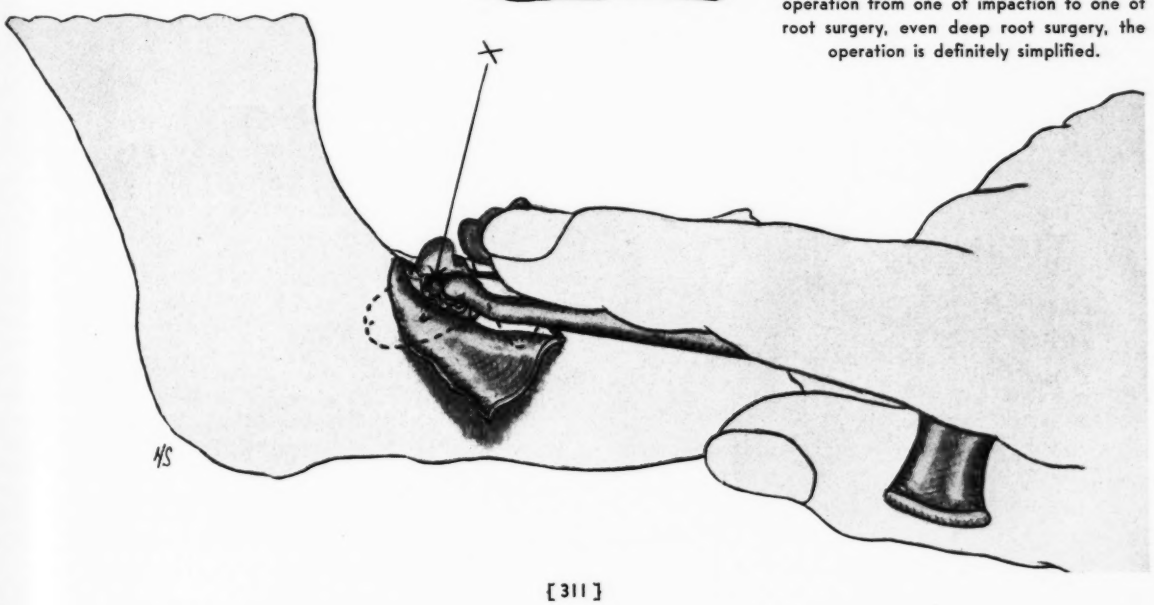

Fig. 5 (Step 5)—The patholever I have designed is here introduced to lift off the crown from the root. If the hollowing-out process has been well taken care of, there should be little difficulty with the sectioning of the crown from the root. As a matter of fact, as soon as the crown of the impacted molar has been removed there remains only an embedded root to be taken out rather than an impacted tooth. By reducing the operation from one of impaction to one of root surgery, even deep root surgery, the operation is definitely simplified.

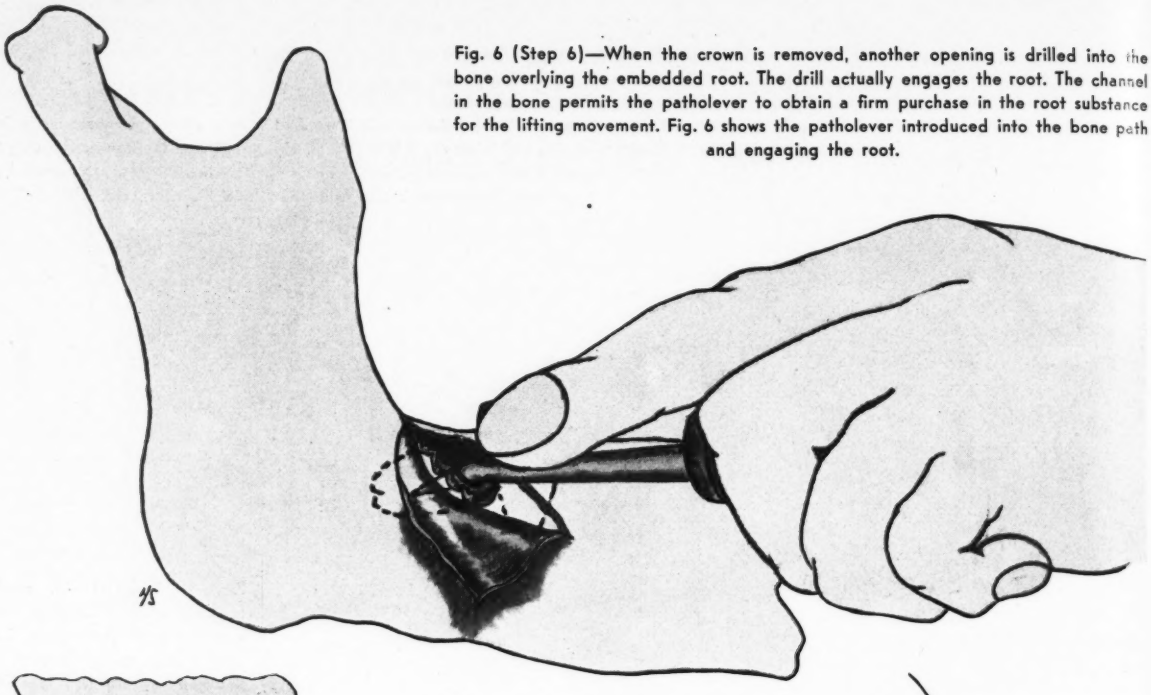

Fig. 6 (Step 6)—When the crown is removed, another opening is drilled into the bone overlying the embedded root. The drill actually engages the root. The channel in the bone permits the patholever to obtain a firm purchase in the root substance for the lifting movement. Fig. 6 shows the patholever introduced into the bone path and engaging the root.

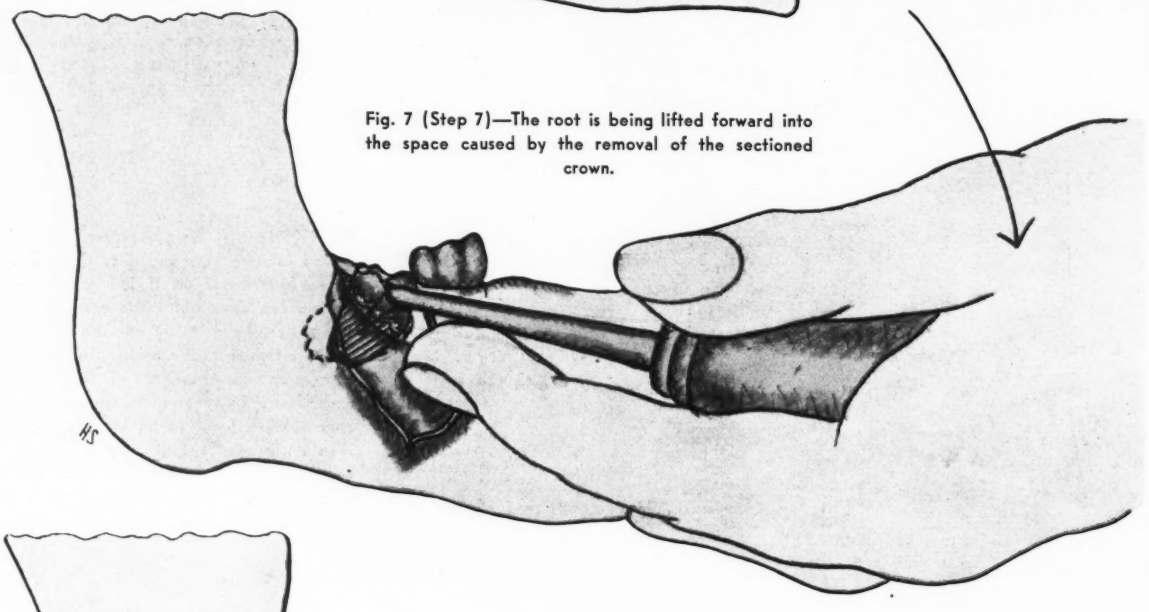

Fig. 7 (Step 7)—The root is being lifted forward into the space caused by the removal of the sectioned crown.

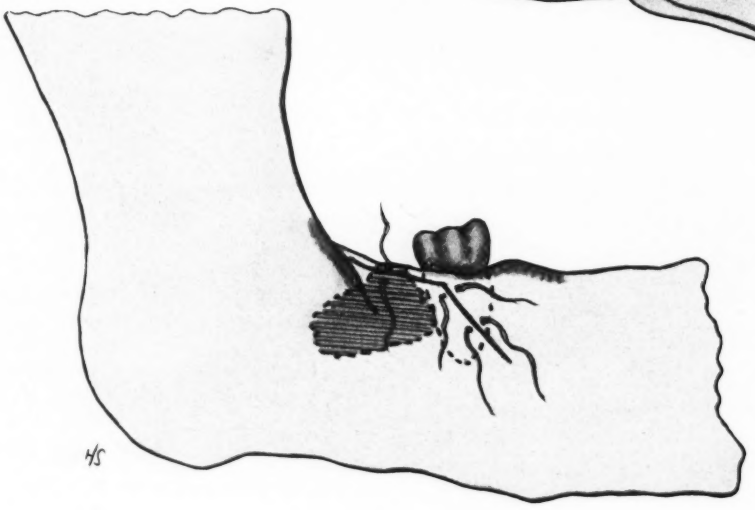

Fig. 8 (Step 8)—The final step is the suturing of the mucoperiosteum into the position of original attachment. Between the sutures, a vaselined gauze dressing is introduced into the bone crypt. I use as a dressing equal parts of orthoform and thymol iodide (or aristol) with vaseline to form a paste. This paste is applied to mercurochrome gauze. There is nothing in this dressing that has a disagreeable odor or taste, and I have found it satisfactory from every point of view.

The Editor's Page

BOOK reviewers have a way of spilling superlatives over a page when in a good mood; reviewers of a dyspeptic disposition lament as if the art of English writing died with Shakespeare.

At best, reading a book in the heat of late summer is a task, and reviewing one is quite beyond consideration. Recently, however, there has come our way a scientific book the interest in which even the heat of late summer could not dispel. Ernst Huber, Ph.D., M.D., of the anatomy department of Johns Hopkins University, has written *Evolution of Facial Musculature and Expression* which should be read by every dentist.

The style is not of the so-called popular kind; it is written in scientific language, free from the devious devices of questionable interpretations. The author confines himself to the subject (and uses B N A terminology) in which if he had been less factual he could have been carried into the twilight zone of the pseudo sciences of phrenology and physiognomy. The book is valuable and a contribution to that field of human anatomy which is of great concern to us as dentists: the human face.

It is significant that the dental profession is becoming more and more aware of the esthetic importance of its work. It has been our privilege to publish several articles in the recent issues of this journal on the various aspects of dental esthetics. The article by Doctor Brown on facial restoration which begins in this issue opens a fertile field of interest. The dentist who approaches the case of the edentulous patient as an engineering and mechanical problem and as an artistic adventure may expect both the spiritual rewards of the artist and the more tangible profits of the craftsman.

"Art for art's sake" may not appear as a satisfactory return to the practical mind of the dentist who, particularly in these days of uncertainty, is very much concerned about the economics of dental practice. Dental art, however, has a pragmatic value. The dentist who preserves, protects, and restores the human face may justly expect tangible rewards from satisfied patients. If not "art for art's sake" alone we should be interested in dental art for business's sake.

We dentists at one time could rationalize ourselves out of a bad situation by placing the major blame for some of the denture horrors on the dental manufacturers. Whatever we might do with an artistic hand or eye would be quickly annulled by the ghoulish teeth and the spectral rubber that we had to use. Now our alibis are gone. The manufacturers have supplied us with teeth that are excellent in form and color and with lifelike denture materials.

Doctor Huber points out in his book that in the "ascending scale of primates" man differs from the great anthropoids in that (1) he shows a tendency toward reduction of the facial musculature of the temporal and occipital region; (2) there is a functional deterioration of the entire ear musculature; and (3) the muscles of the face proper tend toward fuller development and further differentiation, especially of the musculature about the mouth. Furthermore, the author emphasizes the fact that the spontaneous facial expressions, as seen in man, result from varied emotional reactions and that the gradual perfection of articulated language had a decisive influence on the evolution of mimetic musculature and facial expression. The postnatal changes in the proportions of the facial muscles are slight and they grow in proportion to the whole head, while the muscles of mastication are undeveloped at birth and grow rapidly with the development of the masticatory mechanism.

This difference in the two muscle groups is significant. Although in the dental field of activity we may have little or nothing to do with the development of the true facial muscles, we have a distinct influence on the muscles of the masticatory group as they are intimately associated with the process of dentition. In practically every department of clinical dentistry we have an opportunity to influence the development and preserve the harmony of the masticatory muscles and thus contribute to the esthetics of the human face.

The Periodontist's Armamentarium

A PHILOSOPHY OF THE TREATMENT OF PERIODONTAL DISEASE

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FOR several years, on approaching a patient seeking relief from periodontal disease, I have put aside my knowledge of the science of dental pathology and regarded the case in the light of dental physiology. My contention is that physiology provides the solution for the problem of treatment of disease—with all due respect to the achievements of the pathologists in dental science.

Pathology is a science devoted to the nature and study of disease. Histopathology reveals the minute changes that take place during its progress. The direction of the process is from the incipient lesion down to the point of death of the part or of the patient. In physiology, the student's interest centers in function; in bodily mechanism; in the proliferation and growth of structures and tissues—in all the biochemical changes that take place in the phenomenon of metabolism and healthy living cells. It is not in the dying and decayed cell, but in the live and normal where interest in treatment should center. I still believe that in order to be able to treat disease, one should be in possession of an intimate knowledge of the nature of the disease. But the essential thing to possess in the successful treatment of disease is some comprehension of the inherent mechanism of health. One must know how to induce changes in the direction of healing, of health, and of strength to be able to bring about a cure. Treatment, therefore, leads naturally to physiology which, in its essence, is the science and foundation of body health.

Hygiene is a subbranch of physiology, and is known as the science and art of the preservation of health. It is popularly thought to mean simply cleanliness. While a healthy mouth is also a clean mouth, it is wrong to deduce that a clean mouth must of necessity be healthy. There is more in the picture of health than the single phenomenon of cleanliness.

It is an indisputable fact that adequate function is the greater item in hygiene. It is greater in its influence on health than diet, unless the diet is grossly deficient, and infinitely greater than the daily bath, though these have their acknowledged places of importance. In all cases the first thought in treatment should be directed toward providing the influence of normal function for the part. One should center his interest from the moment treatment begins on healthy structures and healthy cells, not primarily or wholly on the diseased cells. It is from the proliferation of healthy, living cells lying adjacent to the diseased cells that the process of healing proceeds. To be sure, the clinical records should show the extent of injury the diseased process has caused. But after the history has been taken, and records have been made of the symptoms and clinical facts, there must be some plan of treatment. It is at this point that I put aside the pathologic and adopt the physiologic point of view. A plan of treatment should not be based on pathologic observations alone. Pathology can be useful in therapeutics only when it is viewed from the standpoint of physiology.

There is a school of periodontists who give the body, especially that part in which the interest of the moment centers, obviously no credit for possessing the faculty of healing. They resort to what they call "surgical intervention" or surgical treatment, and base their operation chiefly on what they believe to be the lack of healing power in the affected tissues. I do not believe it is true that affected tissues lack healing power in the vast majority of cases. On the contrary, the faculty of regeneration and healing does reside to a significant degree in every cell of the remaining living periodontal structures. Admittedly, adequate scaling in certain inaccessible pockets is difficult, and sometimes impossible without providing access by the turning back of a gingival flap. Such an operation may be warranted if it is performed as a part of a plan of treatment tending to take advantage of the biophysical forces of the body. But I have observed that most periodontal surgeons have only the one thought of removing the diseased vascular tissue through excision of the gingiva and curettage of the alveolar bone.

For several years I considered it necessary to make smears for the purpose of identifying the bacterial flora of the mouth. I continued this as a routine of the recorded clinical examination until one day I realized that I had never made use of these smears nor made a single change in my plan of treatment in any case because of the nature of these observations. I know of no way to apply such knowledge to the problem of treatment. Since the days of Riggs, those who treat periodontal disease as a specialty have employed an identical procedure in the treatment of all cases, regardless of the pathologic and the bacteriologic observations.

Another group in the dental profession has become intensely interested in the problem of diet with special reference to calcium metabolism. Dietary balance is extremely important, but nutrition should be recognized for what it is; namely, an important branch of hygiene. There are, to be sure, certain groups of persons in whom the dietary law is an obvious etiologic factor in the periodontal clinical picture. I think that the diet of patients should be corrected when such correction appears to be necessary. On the other hand, while the teeth will always need adequate metabolic nutrition for health, if the health of the mouth appears to be improved through changes in diet, one may be sure there are occurring coincidental changes throughout the entire organism. There is no food for the teeth alone, even though some foods are shown to improve the quality of teeth and the health of the mouth.

In all instances of infection of the gingiva, there is a coincidental disturbance of the circulation of the blood in the vessels adjacent to the infection. The blood contained in these vessels does not move nor flow in harmony with that in normal vascular parts. This condition of vessel

stasis or suppressed flow is called congestion. All blood contained in the venous circulation has already given up a major portion of its oxygen to tissue cells and should be on its way to the lungs to be reoxidized. With the incident of congestion, this migration of blood cells is impeded and the impounded blood becomes functionally impotent because of, for one thing, this impoverishment of oxygen. The entire cell mechanism of the body depends on oxygen for its very life, and this can be replenished only in the natural way, by the function of the lungs.

In many periodontal pockets, there are found vessels lying exposed on the ulcerated inner surface. Vessels at these sites are denuded of the protective epithelial covering provided ordinarily to vessels by nature. The hemorrhage of dark-colored, rapid-clotting blood, which follows the introduction of a scaler into a pocket, is a constant phenomenon in scaling. When an oxygen gas is introduced on such a surface, there takes place immediately a reaction in coloration similar to that which takes place when the blood finally reaches the lungs. All deoxidized blood within vessels will greedily take up oxygen at all times. As the color of the tissue is dependent largely on the quality of blood contained, and as the appearance of health is also largely determined by its characteristic blood coloration, the observed reaction of the tissue to the gas applied with the "borated oxygen gas machine" was a pleasing prospect to the operator at the time of the introduction of that machine.

In the treatment of disease, the major difficulty is in getting the physical mechanism of the body to resume normal operations. When these are all running along normally, there is no disease anywhere in the body; for at such times the organism is supplied with adequate defenses against attack and can rapidly and automatically make any needed defense and repair. Therapeutic interest should, therefore, lie in making the physical organism or the affected part resume all of its natural functions rather than in attempting to reoxygenize the blood directly at the site by means of a topical application of gas.

The more rational procedure would be to drain the vessels by massage and permit them to refill with fully oxygenated arterial blood. I do not use the tank of gas for the purpose for which it was intended because I think it a clumsy means of accomplishing what can be done more effectively by the lungs after circulation has been resumed. On the other hand, if a supply of oxygenated blood were the only factor in the problem of treatment, which it is not, and the natural way were not so easy to accomplish, and one knew of no better idea in treatment—then I might employ the gas tank, for, at least, the idea is a rational one based on correct observation.

All success in treatment of periodontal disease can be attributed entirely to the healing faculties resident in the bodies of every patient. Physicians and dentists cannot confer the healing faculty, but they can in some measure comprehend body needs. Any purpose in treatment that does not lie parallel and proceed with the faculty of healing is futile.

Now the question in the treatment in periodontal disease is how to interpret the needs of the living cells, and to release the biologic impulse that makes healing and health possible; how to perform some intelligent, comprehending kindness to the part instead of committing some absurd or irrational act.

In all cases, the first thought in treatment should be directed toward providing the influence of normal function for the part. The proper function of the teeth is largely dependent on the mechanical harmony of the occlusion, but not entirely so. There is a function of the cell and the circulation of the blood, and these are equally important in any consideration of treatment. Each act of treatment should be so performed as to give release to both mechanical and biologic faculties.

Treatment

Scaling—The periodontal scaler is still held in as high esteem today as at any time since Riggs first introduced it. It was designed to remove substances from the root surfaces, and it is believed that this act will always be a necessity. It is true that Hutchinson used a carborundum stone on the occlusal surfaces of teeth some years before I took up the treatment of pyorrhea.

Grinding—It is my belief that grinding, which is the relief given teeth having excessive occlusal pressure, will in such cases always be a prerequisite to the phenomenon of healing in the treatment of periodontal disease. All successful periodontists employ the scaler and the carborundum stone.

Stimulating—The third item in the armamentarium is the toothbrush. The toothbrush was popular even before Riggs, but it was not employed for the purpose for which it is used today.

The scaler, the carborundum stone, and the toothbrush comprise the armamentarium of the periodontist. I used these instruments in the early days of my practice and used them in the same way I do now. The only difference is in the attitude of approach—a better understanding and interpretation of the biologic needs of the dental organs with regard to their ease and health.

Inasmuch as in nearly all cases of periodontoclasia a better equilibrium and freedom of action of the mandible in occlusion is needed, the carborundum stone is usually the first thought in treatment. This is employed to provide a better ability to occlude the teeth and a freedom of use which will preclude the possibility of a continuing traumatic occlusion. It is used only with the intention of providing physiologic ease for the teeth. When the ability to function easily is acquired, it is expected that the faculty of normal use will be employed, and that, as in all hygiene, an improvement in health will follow under the influence of normal exercise.

The periodontal scaler will always be necessary whenever disease has progressed to the extent of a gingivitis. Even before the roentgenogram reveals an injury to the bone, filth, a waste product of inflammation, will have begun to accumulate on the tooth surface. The best means of getting rid of it is by use of the scaler. The teeth must be made clean. Deposits on roots act as do foreign bodies in the flesh: they prevent and obstruct healing and aid in prolonging infection.

Purpose of Toothbrushing

The proper brushing of the teeth is introduced to the patient when the ability to use the teeth naturally and easily has been made possible by

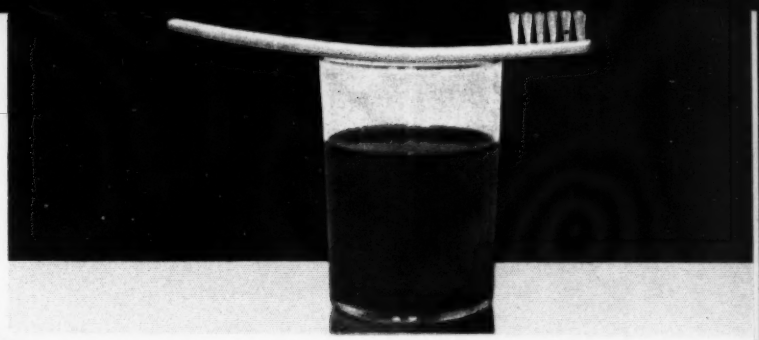

Fig. 1—Toothbrush and liquid dentifrice.

Fig. 2—Application of brush and blanching of gums as a result of pressure.

Fig. 3—Blushing of gums as a reaction after blanching.

Fig. 4—Position of the brush in the region of the upper first molar and bicuspid.

Fig. 5—Application of the brush to lingual surfaces of upper bicuspids. Note that the brush is placed at a 45° angle to the surface.

Fig. 6—Application of brush to lingual surfaces of lower bicuspids.

Fig. 7—Application of brush to lingual surfaces of upper incisors. Note that the handle of the brush is at a right angle to the long axis of teeth.

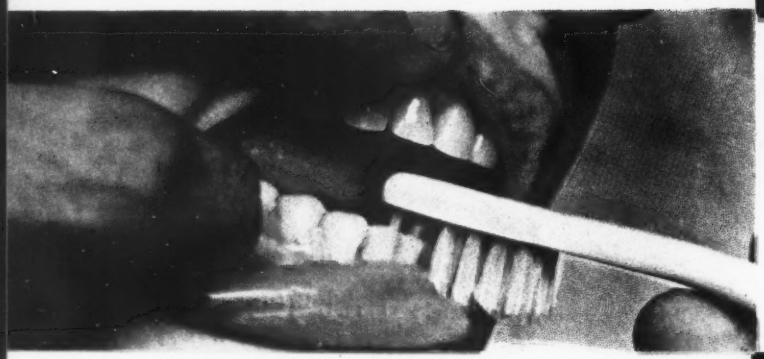

Fig. 8—Application of brush to lingual surfaces of lower incisors. Note that the handle of brush is at a right angle to the long axis of teeth.

Fig. 9—Blushing of gingivae after application of brush.

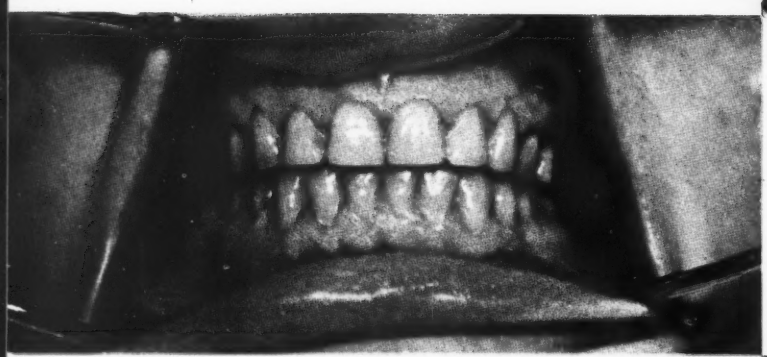

Fig. 10—Appearance of mouth before brushing.

Fig. 11—Appearance of mouth after brushing.

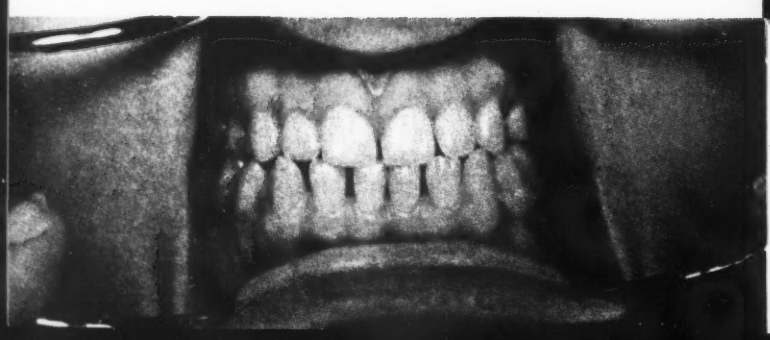

Fig. 12—Example of highly stimulated gingiva after toothbrushing.

slightly changing their form with the carborundum stone, and when there is no longer any calculus on the roots and all enamel surfaces have been made clean.

The patient must learn a new conception of the purpose of the toothbrush and the physiologic principle through which he is to derive dental health. As a fundamental thought, the brush is never to be used with the sole purpose of cleaning teeth. That its proper use does clean the mouth is true, but it is incidental. Friction produced by the toothbrush is harmful. Some teeth can endure it but friction does not aid in increasing health. The physical reaction in the circulation from the correct use of the toothbrush should be, as nearly as possible, identical with the physical reaction due to the function of mastication. During the act of eating (chewing) there occurs, as in all other exercise, a speeding up of the circulation of blood in the part at work. It is this effect that is desired from the brush. The use of the toothbrush for this purpose requires a different technique from that commonly employed.

Technique of Toothbrushing

1. A new brush is selected, and a glass of tepid water to which has been added a quantity of table salt, sufficient for a physiologic solution of sodium chloride, is made ready. A small quantity, from 5 to 10 grains, of sodium bicarbonate may also be added.

2. The brush is rinsed in the solution and carried to the incisor region where it is placed with the bristle ends resting partly on the gingivae and partly on the cervical portion of the teeth.

3. The bristles are not placed at right angles with the surface as was the custom when the toothbrush was used in the manner of a scrubbing brush. The bristles are placed obliquely to the long axis of the tooth, or at an angle to the plane of the gingival surface and directed apically.

4. The bristles should never be pointed at right angles to the surface of the gingivae, for in this position they may cause puncture. Pressure on the gingivae is desired with the least amount of friction or injury.

5. Sufficient pressure is applied by bending the bristles *slightly*. The effect is a perceptible blanching of the gingival tissue.

6. The brush is lifted and attention is directed to the rapid inrush of blood. This influx and extreme redness soon passes.

7. This act is repeated several times and the handle is given a slight rotary motion, but not enough to cause the bristle ends to move from the positions in which they were first placed. The bristles may be bent in any of three directions but the ends of the bristles should always remain as placed.

The length and pliability of the bristles permit their bending and slight movement without causing friction. This process of compression must be produced by the patient on each surface of the gingivae throughout the entire mouth—labial, buccal, and lingual.

8. Only the occlusal surfaces of bicuspids and molars may be "scrubbed." Here the brush may be used as vigorously and even as violently as desired, for the bristle ends will never come in contact with the gingiva and no harm can be produced to the occlusal enamel. These surfaces should be given a thorough scrubbing, allowing the bristle ends to penetrate deeply into the sulci.

9. The patient should be taught to make each successive step in a systematic way, beginning at the right upper molar, for instance, and from there by successive steps to the left upper molar; then all of the lingual surfaces of all of the upper teeth and gingivae. The same progressive steps should be carried out for the lower jaw, care being taken that the same blanching and blushing is produced wherever the gingival margin adjoins a tooth surface, the position of the brush being modified to suit each location.

10. The brush is applied to the lingual surfaces of the upper and lower anterior teeth with the handle parallel to the sagittal plane instead of at right angles. In this region only the two or three end tufts of bristles will be utilized to the length of the incisor crowns.

11. The brushing of the entire mouth should be repeated not less than four times during a treatment, and should be performed twice daily. Each time the brush is given a step along the gingivae, it is rinsed in the prepared solution. If the contamination is excessive, the brush should first be rinsed in plain tepid water before it is carried to the solution.

After the treatment, inspection of the gingivae will reveal a fading out of the previous high coloration, indicative of the constriction of the arterioles. Hemorrhages may take place if congestion is pronounced, but are unimportant, or may even serve the useful purpose of effectually removing stagnant blood, which will then be replaced with the new supply. The patient will also experience a warmth throughout the maxillary structures as a result of the vigorous coursing of the blood through the vessels of this region. Unless this physical sensation and accompanying color reaction is attained each time the brush is used, the operation has not been adequately performed.

Permanent cleanliness of the teeth occurs only when the health tone of the periodontium is high. When the health of these tissues begins to ebb, persistent untidiness is usually the earliest symptom to be observed. The patient should be warned that when he sees his mouth retaining its cleanliness, with little effort on his part, he is not to relax his efforts with the brush.

Color of Teeth

Color, for the skin as well as the teeth, depends on a natural pigment and the blood circulation. The natural pigmentation is a matter that cannot be corrected or improved for natural vital teeth. Blood circulation, however, within the dental pulp can be influenced decidedly by the proper use of the toothbrush. When circulation is sluggish, color changes occur in the body in all its parts; this is strikingly true of the teeth. Traumatic occlusion of a slight degree is sufficient to establish a dull coloration in the tooth. The concomitant irritation to vessel mechanism and the subsequent injury to the investing tissues provide a disproportion between the reproduction of cells in the periodontium and an active circulation of blood in the gingival vessels. Healthy teeth have flowing blood within the dental pulp which accounts for tooth translucency. It is futile to clean enamel in an effort to provide the luster of health caused only by freely circulating blood within the tooth itself.

THE ESTHETICS OF FACIAL RESTORATION

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ACCORDING to Webster, esthetics means "the theory or philosophy of taste; science of the beautiful in nature or art." According to prosthetic dentistry, esthetics means the "return to the norm," and by the word "norm" is meant the correct facial dimensions for the individual case in hand. There can be no set rule for the norm of a prosthetic patient other than the rule established by Nature when that particular person was created. Nature intended that each face should have certain definite proportions, and those proportions constitute the norm for that particular person. In establishing an esthetic reconstruction in any given case in which the original dimensions have been changed, one is, therefore, confronted with the task of returning those dimensions to their own particular norm. That last remark is exactly equal to saying that all a sculptor has to do is to cut away what he does not want in order to produce a beautiful piece of statuary. In other words, both are easier to say than to do. In prosthetic dentistry faces are truly being sculptured, the difference being that the sculpturing has to be done by establishing the correct dimensions and reproducing the lost material which Nature originally placed in the lower third of the face. If dentists succeed in replacing, by means of artificial substitutes, that which has been lost, Nature will see to it that the lips, cheeks, nose, and eyes regain their correct positions, and the finished product will be an esthetic success because that face will have been returned to its norm.

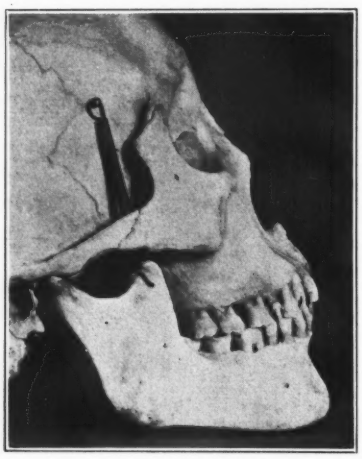

Fig. 1—Skull showing definite loss of distance.

The skull in Fig. 1 shows a definite loss of distance. One can hardly say just how much tooth structure has been worn away, but it is fairly safe to assume that 4 mm. have been lost. Fig. 2 (left-hand view) represents the expression that wear of this kind produces in life. Fig. 1 is shown simply to illustrate the amount of deformity which may result from as little as a 4 mm. shortening of the vertical distance, and to point out the necessity of accuracy in vertical, dimensional distance when the whole of the tooth and part of the alveolus have been lost.

Fig. 2—Wear due to loss of distance produces expression shown at left.

In many cases (Fig. 3) as much as 24 mm. must sometimes be supplied in order that the face may be returned to its norm. It is often impossible to make the whole restoration in one gigantic jump; instead, a series of restorations must be made, gradually increasing the vertical dimension until the proper one is reached.

Muscles of the Face

Figs. 5, 6, 7, and 8 show what muscles are affected by a change in vertical distance. The masseter muscle is shown in Figs. 4, 5, and 6. It is intended to run from the anterior portion of the zygomatic arch to the lower, posterior border of the mandible; and when the mandible is in its correct relation to the maxilla, it is flexed to its fullest extent during mastication. To shorten the vertical dimension causes this muscle to be shortened, and the lower ends of the fibers are not exercised during eating or talking. Inasmuch as fatty tissue always settles in an unused part, this muscle becomes impregnated with fat when shortened, and the heavy chops which are one of the first signs of old age (Fig. 2, left) are formed.

Fig. 3—Gradual restoration of 24 mm. of lost vertical dimension would be required to return face to its norm.

The buccinator muscle (Fig. 5), which lies underneath the masseter muscle and runs from the inner border of the mandible to merge with fibers of the obicularis oris, is also crowded for space vertically and is forced out of position, causing the cheek to have a flabby, pouty appearance, and helping to deepen the lines running from the alae of the nose to the corners of the mouth (Fig. 2, left).

The obicularis oris muscle (Figs. 5 and 6) which makes up the upper and lower lip is a circular muscle, the orifice of the mouth being merely a

slit through its center. When the upper half of this is encroached upon by pressure from below it loses its original shape, and instead of holding its correct position (Fig. 2, right) the opening becomes merely a slit between two folds of tissue. The center rolls outward and downward and the corners are depressed because of lack of tension by the levator anguli oris and added tension on the depressor labi inferioris. This not only allows the corners of the mouth to droop, but also pushes the obicularis oris up, and lessens the tension on the caput infra-arbitale, the muscle that normally holds the obicularis oculi flat against the zygomatic bone (Figs. 5 and 6). This lessening of tension on the obicularis oculi allows the lower eyelid to draw up out of its correct position causing squinting.

Thus, the effects on the face of an abnormal shortening of the vertical bony understructure are seen. Each muscle depends on the others. Any distortion starts a vicious circle of deformity that can only be corrected by correcting the cause which, in this case, is the reestablishment of the correct vertical dimensions. In brief, the abnormalities following loss of vertical dimension are: (1) narrowing or squinting of the eye; (2) pouting of the cheek; (3) distention of the base of the nose and deep wrinkles at the alae; (4) drooping of the corners of the mouth; (5) outward and downward roll of the lower lip, and (6) flabbiness or chops in the cheek.

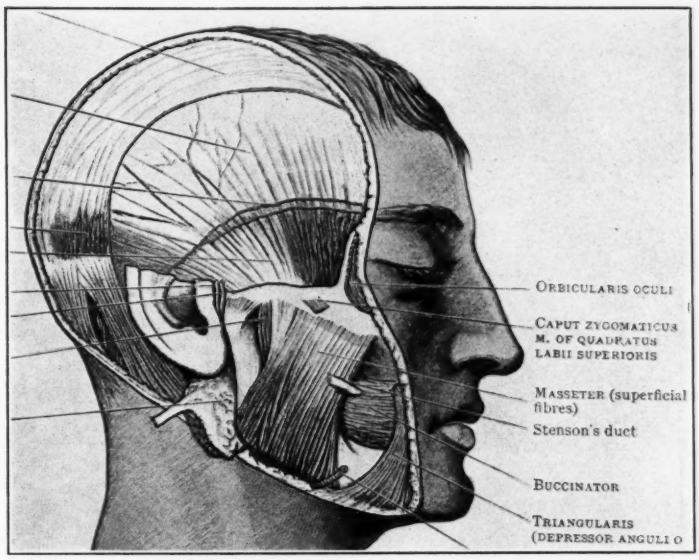

Fig. 4

THROAT AND FLOOR OF THE MOUTH

A study of Figs. 7 and 8 shows that the mandible is nothing more or less than a glorified bag holder. The mylohyoid (Fig. 8) makes up the floor of the mouth, held taut by the geniohyoid and the anterior and posterior bellies of the digastric muscle. Fig. 7 shows the back view of the superior and middle constrictors which are normally held taut by the stylopharyngeus and the lateral bony attachments. To crowd these muscles into incorrect positions, such as those which result when the mandible is allowed to assume an unnatural position, means that the throat and mouth are going to be crowded so abnormally full of tissue that complete drainage in swallowing will be impossible. The tongue is going to be crowded upward and outward, encroaching upon the ridges, and making it impossible to fit the mandibular denture correctly.

Crowding of the floor of the mouth lessens the resonance of the oral cavity, which is so necessary to correct enunciation, and the patient will talk as though he had a mouthful of food. It is difficult enough for patients to speak clearly with new dentures without adding to their difficulties by introducing into their mouths abnormal muscular tissue. When these tissues spread out and encroach upon the ridges one is tempted, if not compelled, to reduce the size of the mandibular base to keep the denture from being raised by the muscles. This is apt to lead to the condition represented in Fig. 9.

With the mouth closed abnormally the mandibular denture is constantly being moved, and is apt to be trimmed to the size shown on the right in Fig. 9. By opening the bite correctly the margins can be extended, as indicated on the left, without too much muscular interference.

Figs. 10 and 11 show the front and side views of a patient who had been wearing the same dentures for fifteen years with barely 15 mm. of distance between the anterior ridges. The similarity between the front view and Fig. 2 will be noted. The eye is pushed up by the cheek into a squint. The nose is flattened. The alae are depressed and deep wrinkles are present. The corners of the mouth are depressed and the center is rolled out and down. Heavy chops are present at the angle of the mandible, causing the face to assume a short, square appearance. The chin has assumed a

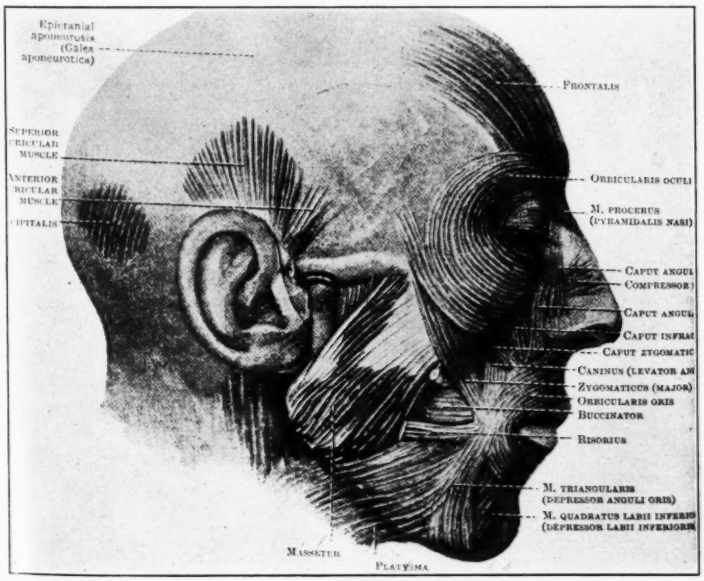

Fig. 5

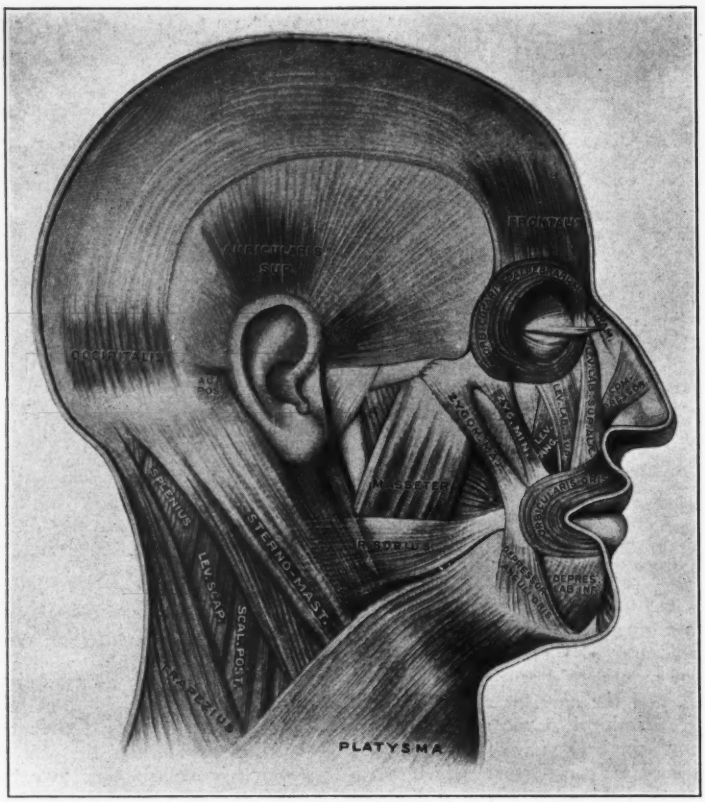

Fig. 6

forced out. The cause must be removed. One should not attempt to treat the result while the disturbing factor is allowed to remain.

Figs. 15 and 16 show an interesting case of lateral displacement. This case should really come under the head of operative dentistry because the patient still retains some of her natural teeth, but the combined effect of closure and lateral displacement is pertinent.

Report of Case

Examination—A woman came in for treatment because of excruciating pain in the region of the temporomandibular joint which had continued for months. An examination showed that

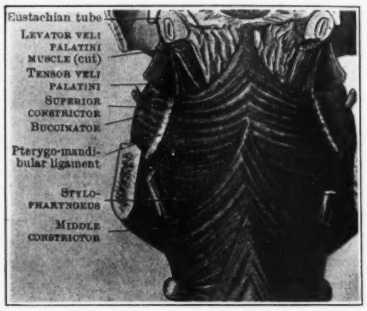

Fig. 7

forward thrust until the whole profile of the face (Fig. 11) is concave. The throat muscles appear flabby and there is a double chin. This is due to a crowding of the platysma (Fig. 6).

Figs. 12 and 13 show that the eye has been opened. The nose has been narrowed at the alae, and the removal of the chops has transformed the face from a square to a taper. In Fig. 13 the change is also noted in the opening of the eye and the disappearance of the high, flabby cheek muscles. The effect on the chin and throat may be seen in Fig. 12. With the chin back in its proper position the profile becomes convex instead of concave, and the double chin is almost wholly removed. This pleasing transformation was brought about by the addition of 9 mm. of vertical dimension, together with the proper denture design, to allow the soft tissues to drape into their correct position. The understructure must be restored so that the muscles can fall naturally into correct positions.

Fig. 14 shows an attempt at upholstering to build out an upper lip. The effect, of course, was a grotesque failure. The bite must be opened and room allowed for the lip to drop easily into its correct position. The lip is out of position because it was

Figs. 4, 5, 6, 7, and 8—Muscles affected by a change in vertical distance. Masseter muscle (Figs. 4, 5, and 6); buccinator (Fig. 5); obicularis oris (Figs. 5 and 6); back view of superior and middle constrictors (Fig. 7); mylohyoid (Fig. 8).

(Figs. 4, 5, 7, and 8 are from Cunningham's Textbook of Anatomy, New York, William Wood & Co. Fig. 6 is from Gerrish's Anatomy, Philadelphia, Lea & Febiger. These illustrations are reproduced with the permission of the publishers.)

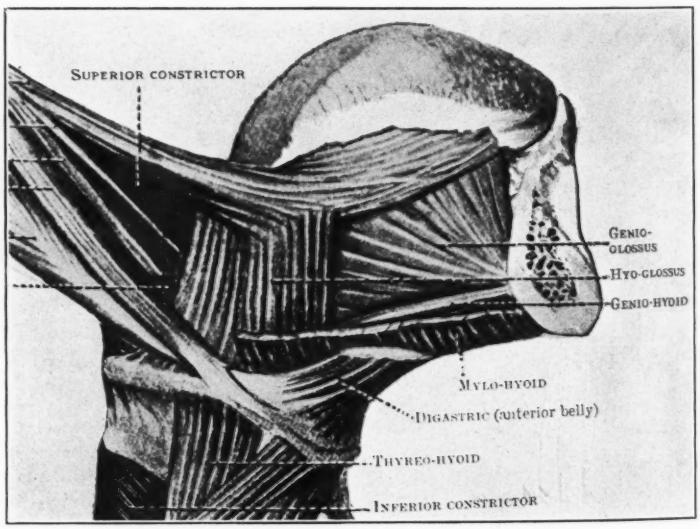

Fig. 8

Fig. 9—Condition resulting from reduction in size of the mandibular base to keep the denture from being raised by the muscles.

the patient was wearing partial dentures which had settled out of occlusion, and that the mandible had moved to the right, the width of one lower incisor, before enough teeth came into occlusion to hold the denture in any set position. Digital examination (Fig. 17) in the external auditory meatus showed that there was a decided backward thrust to the mandible as well as the apparent lateral displacement.

Treatment—Centric occlusion was established. The backward thrust of the condyle was tested by inserting the little fingers in the external auditory meatus, and the amount of vertical displacement was thus determined. New dentures were then constructed to reestablish both of the lost dimensions, and the pain was relieved. The effect on the facial expression (Fig. 17) is partly the result of correct dimensional distance, and partly relief from the pain.

Fig. 18 shows the models of a prognathous patient. Practically all of the teeth are present, but the upper anteriors bite completely inside the lower anteriors. If Figs. 19 and 20 are compared with Figs. 10 and 11, the similarity of the effect on the expression will be noted. The bite should have been opened with all of

Fig. 10

Fig. 11

Figs. 10 and 11—Patient had been wearing the same dentures for fifteen years with barely 15 mm. of distance between the anterior ridges.

Fig. 12

Fig. 13

Figs. 12 and 13—Improvement brought about by addition of 9 mm. of vertical dimension and proper denture design. Compare with Figs. 10 and 11.

Fig. 14—Unsuccessful attempt to build out an upper lip.

Fig. 15

Fig. 16

Figs. 15 and 16—An interesting case of lateral displacement.

Fig. 17—Digital examination in the external auditory meatus to determine amount of vertical displacement.

the natural teeth retained in position, but the patient did not wish to pay the necessary expense in time and money; therefore, the upper teeth were extracted and a denture inserted, with the result shown in Figs. 21 and 22.

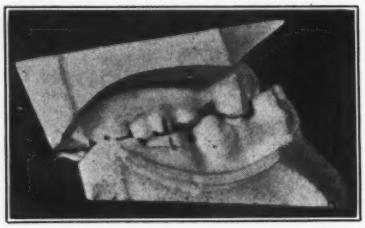

Fig. 18—Models of a prognathous patient.

Fig. 19

Fig. 20

Figs. 19 and 20—Note that the effect on the expression here is similar to that in Figs. 10 and 11.

Fig. 3 shows an elderly woman whose appearance could undoubtedly be improved by the insertion of a set of dentures of the proper size and shape. The dentures now in place have been worn for forty years and still they are perfectly comfortable. While they are loose and the ridges have resorbed until there is practically nothing left, the patient is able to use them to her complete satisfaction. In a situation of this sort I feel that it is wiser to let well enough alone. The patient is 73 years of age. Why cause her the discomfort of breaking in several new sets of dentures? In these cases the opening process would

Fig. 21

Fig. 22

Figs. 21 and 22—Same patient shown in Figs. 19 and 20 after upper teeth were extracted and a denture inserted.

necessarily have to be done gradually. The patient would have to wear one set until she became accustomed to it before another was made with a few millimeters added in the vertical opening. These are the cases that complicate the problem of condylar retrusion in the temporomandibular joint area. Unquestionably, this patient lost at least 10 mm. of vertical dimension through alveolar resorption during the forty years she has worn this set of dentures, and yet she has no symptoms of deafness, pain, nor tinnitus. On the other hand, her husband, the models of whose teeth (Fig. 23) closely resemble those shown in Fig. 1, has lost barely 4 mm. as a result of a gradual wearing down of his natural teeth, but he was becoming increasingly deaf. He recovered his hearing within two months after his bite was restored to its norm. The

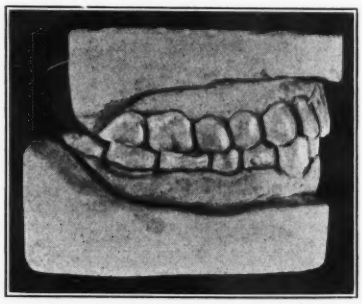

Fig. 23—Models closely resembling teeth shown in Fig. 1. Barely 4 mm. were lost as a result of gradual wearing down of natural teeth, but patient was becoming increasingly deaf.

improvement seen when only a few millimeters of lost vertical dimension are restored to normal makes one realize the absolute necessity of accurate measurements when from 16 to 25 mm. of lost distance are to be restored by means of artificial dentures.

The prosthetic end of dentistry calls for work of delicate accuracy. When one realizes the possibilities for harm that a bit of carelessness may cause, he cannot help but appreciate the confidence reposed in the dentist's ability by the patient, and the necessity to justify that confidence. Failure to reproduce the exact vertical dimension in the case shown in Fig. 23 would mean that the patient would go through life missing one of his greatest blessings, his hearing. Failure to establish correct centric occlusion coupled with the correct vertical dimension (Fig. 15) would mean that the patient would continue to suffer the excruciating pain caused by abnormal pressure from a dislocated condyle head.

Dentists set dislocated joints (temporomandibular) as truly as the physician, but they do it by inserting dentures. If the vertical dimension is not correct the patient must go through life with a dislocation. Is it any wonder that some patients are unable to use the dentures made for them?

Correct facial expression depends on the restoration by means of an artificial substitute of that which has been lost. Unless the work is done accurately the restoration will not be successful. Patients may wear the dentures made for them but never with the degree of satisfaction that would have been theirs had the measurements been correct. When the dentist sees such patients after a few months he will know that he could have done a better job even if no complaint is made. After all, the only lasting satisfaction dentists can get out of their work is the satisfaction of knowing they have kept faith. A piece of work well done makes the job worth while. It takes dentists out of the humdrum of office routine and puts them on a par with creative artists if they help their patients to meet the world with confidence, secure in the knowledge that their faces present no grotesque deformity which so often accompanies the insertion of dentures. It is no wonder they cling to a few old, diseased teeth. They are afraid they too will look like some of their acquaintances if they allow dentures to be made.

Technique

It is not often that it is desirable to reproduce the expression exactly as it existed just prior to the extraction, but this is comparatively easy to do (Figs. 24 and 25). Photographs can be made and enlarged, and by comparing the enlargement with the waxed-up try-in, it is not difficult to reproduce the same expression, inasmuch as the muscles of expression have not had time, between the extraction and the insertion of the dentures, to become hopelessly distorted. I find that a photograph enlarged to 11 by 14 inches works best in such cases. The conditions are somewhat exaggerated, and it is easier to work out the expression.

Fig 24

Fig. 25

Figs. 24 and 25—Photographs taken and enlarged just prior to extraction in order to reproduce exact expressions.

Various methods are advocated for this sort of work, such as profile cut-outs, profile roentgenograms, and soft lead wires bent to conform to the profile. I prefer to enlarge a photograph, and depend on comparing that with the waxed try-in. If one wishes to use the cut-outs, either photographic or roentgenographic, he must be sure that the reproductions are exactly life size. There is no rule by which to go. One must depend on the trained eye. I feel that experience counts more in this particular phase of the work than in any other in dentistry. The outcome in every case must be studied months following the insertion of the denture to see whether the face retains the proper expression after the muscles drape into place over the framework. If they do not, there has been a mistake made which should not be allowed to happen again. It is necessary to study faces constantly and to take more time with the try-in. The face must be studied under different lights and from various angles. Patients must be made to forget themselves in discussions on subjects in which they are interested. It is a mistake to depend wholly on the harsh, direct light of the operating room to get the best effect. Patients should be permitted to get up and walk around so that hasty glimpses of their true expressions may be caught. They will not look natural sitting stiffly in a dental chair with a glaringly white towel around their necks. Patients may be viewed from all angles while seated in an easy chair in the reception room, reading a magazine, and standing. The dentist himself should stand and sit down again so that he may see his patients as they are going to be seen by those with whom they come in contact. An hour spent in this way will be more than well spent. The patient

Fig. 26

Fig. 27

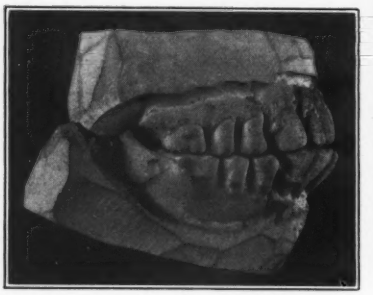

Fig. 28

Figs. 26, 27, and 28—Patient in whom the anterior teeth were forced forward and the bite closed.

cannot help but feel that the dentist is bending every effort to make him look as he should.

Usually the faces are badly distorted and must be returned to their norms. Figs. 26, 27, and 28 show a patient in whom the anterior teeth were forced forward and the bite closed. In a case of this type an old photograph, taken before the distortion took place, is of great value.

Fig. 29 shows a patient in whom the early extraction of the upper cuspids allowed the face to assume an unnatural expression. In these cases a retouched photograph, such as a professional photographer produces, is often a help, for in retouching the pained, pinched expression around the mouth is painted out, and that is exactly the condition that should be produced. Ordinarily, I ask for a kodak snap shot taken as large as possible, because that usually shows the true expression. This I view under a high-power reading glass, and can usually get a fair idea of what I wish to do.

Fig. 29—Early extraction of upper cuspids allowed the face to assume an unnatural expression.

If the muscular distortion is the result of years of gradual closure, as in Fig. 13, a different procedure must be used. Here, experience and the study of the faces seen every day will help. There can be no hard and fast rule. The existing lip line cannot be used for a guide because it is not where it belongs. The patient shown in Fig. 13 was given 9 mm. of additional vertical opening. The week following the insertion of the dentures the patient seemed "all teeth." Photographic records of previous cases enabled me to show her that others had survived such a change greatly benefited in facial expression. One simply must know when he is right and be able to persuade the patient to give the denture a fair trial. There is nothing quite like photographs to substantiate one's statements. Once the patient realizes that the dentist is sure of his ground, he will let the dentist have his say in the matter.

When all facial landmarks have been blotted out by muscular distortion, and in the absence of previous photographs, one is compelled to rely on the position of the condyle head in the glenoid fossa to tell when the mandible is in its correct position. Bite blocks are made and checked for centric occlusion. The little fingers are inserted into the external auditory meatus with the thumbs pressing on the forehead to throw the fleshy part of the finger against the condyle (Fig. 17).

By having the patient open and close the mouth, one can feel the condyle as it comes back in closing to press against the external auditory meatus. If the bite is too close, one can feel a decided backward thrust which is to be checked. Bite blocks are built just high enough to check it. We are indebted to Doctor Monson, of St. Paul, for this technique, and I wish to say that with a little experience it gives accurate results. To one unfamiliar with this procedure I might suggest that the technique be tried a few times on someone who has worn off his teeth slightly (Figs. 23 and 1). One quickly learns how to feel when the condyle is in correct position. It might be said that there is too much chance for error to creep into such a technique, but there certainly is no more chance for error than there is when one depends on a distorted lip line as a landmark. The real test comes after the denture has been waxed for the try-in, at which time experience and a trained eye, coupled with the vision of what the patient is going to look like in two months, must come to one's aid.

(End of First Installment)

VINCENT'S INFECTION

PRACTICAL CONSIDERATIONS FOR AN OUTLINE OF BASIS FOR MEDICATION

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Jamestown, North Dakota

ALTHOUGH conservative bacteriologists remain skeptical, the fusospirillary association with Vincent's infection cannot be ignored. If the organisms do not cause the condition, they accompany it. Clinical symptoms abate as these organisms disappear. For the bacteriologist Vincent's infection can be placed properly among his unsolved problems with a number of other diseases. In the field of general medicine "as it stands at present the theory that infectious disease is due to microbes has been proved in some instances, is almost certainly true in others, is a valid working hypothesis in still others, and is on trial in a few cases in which the question of infection itself is doubtful."[1] A "valid working hypothesis" being assumed, three practical suggestions for the diagnosis and treatment of Vincent's infection are presented here under the following headings:

1. Technique for the use of the microscope.
2. Positive slides.
3. Medication.

Use of the Microscope[2]

Stained Smears — My use of the microscope has been confined to stained smears. The microscope is used in the dental office, the smear often being examined while the patient is in the chair. By the use of simple numerals, a permanent record can be made on the patient's card. These microscopic pictures are valuable, possibly not as valuable as roentgenograms, but increasingly valuable as the operator's experience broadens. They must be correlated with other observations. Diagnosis is not made from the smear alone. "With a microscope, a few stains and some glass slides much information can be obtained and extreme skill is not required. Why should the practitioner make a guess as to what is present when in a few minutes he can know?"[3]

Procedure — (1) With a small wire loop, one that can be sterilized in a flame, material is collected from the depths of the gingival crevices. The spirillae penetrate deeply. (2) A drop of water is put on a clean glass slide and (3) the material from the wire loop carefully emulsified in it. (4) This is spread in a thin even film over the glass (a thick smear is useless) and (5) dried in the air. (6) The specimen is then fixed by passing quickly through the flame of a Bunsen burner, with (7) smear held upward. Care should be taken not to overheat; a temperature slightly higher than is comfortable to the touch is hot enough.

On this fixed slide (8) dilute carbol fuchsin is poured and allowed to stand from three to five minutes; (9) it is then washed in running water, and (10) flooded with 10 per cent gentian violet; (11) the slide is then washed thoroughly and (12) blotted dry.

Liquid petrolatum is used with the oil immersion lens. Liquid petrolatum is better than cedar oil; it is cheaper; more easily removed from the slide; the lens never becomes cloudy or gummed; the fingers do not get sticky or gummed, and the field is always clear.[4]

There is little danger of overstaining with dilute carbol fuchsin but a thick smear may be overstained with gentian violet. This may be remedied by removing part of the stain with alcohol. A specimen that has faded may be cleaned with zylol and restained.

Positive Slides

Slides are classed as positive only when both organisms are found. The use of methylene blue (methylthionine chloride, U. S. P.) often fails to show the spiral forms, which may account for many reporting that the bacilli are more often found than the Borrelia. When nicely stained the fusiform organisms will show granules. I record my cases as positive only when tapering granular organisms, usually curved, are found, although slender tapering forms as a type are included. Von Beust[5] presents some excellent photographs and drawings. In several acute cases my co-workers and I have noted his so-called sporulating forms (Fig. 1, C).

In the study of one hundred cases spirals were found in all but ten. Distinction was not made between the *Borrelia vincenti* and the *Treponema microdentium* or *T. macrodentium.* In the process of treatment, in every case the disintegration of the spiral forms was noted. During treatment and with the abating symptoms they become irregular, shorter, and less in numbers. To rid the mouth of all spirals permanently is impossible; the smaller forms are considered nonpathogenic.

A clinical diagnosis of acute Vincent's infection was made in fifteen of the one hundred cases. In all of these the curved, granular, tapering *Fusiformis dentium* was found. Albray[6] has made some interesting observations correlating the size of these organisms with the duration of the infection. In thirteen other cases the same "typical" fusiform organism was found. These were classified as mixed Vincent's infection and pyorrhea alveolaris. With the positive observations thus restricted, twenty-eight were found in one hundred routine cases in which patients reported to a dental office. In no normally healthy mouth were positive microscopic observations made.

Medication

Ehrlich's discoveries in chemotherapy in 1909 consisted in proving arsenic in the form of arsphenamine (later neoarsphenamine) a specific spirochetal agent *in vivo*. He worked with syphilis and its causative organism. But bacteriologists tell us that the *Treponema pallida* of syphilis and the *Borrelia vincenti* of Vincent's infection are biologically closely related organisms, of the class spirochetacea, on the borderline between the bacteria and the protozoans.[7] Drugs, therefore, that are parasiticidal against one may be found, within limits, also effective against the other.

Can the discoveries of Ehrlich[8] and the biologic chemists be used before the bacteriologists, successors of Pasteur, have made their final report? Admittedly, there can be no rational therapy preceding acceptable demonstrable cause, but there is a rational empiricism—"a valid working hypothesis." It is my belief that certain

(Turn to page 330 for continuation of text)

I. DEFINITION

Vincent's infection is a contagious, ulceromembranous stomatitis associated with a fusospirillary symbiosis of *Borrelia vincenti* and *Fusiformis dentium*

II. TERMINOLOGY (*Committee on Nomenclature, American Dental Association,* 1923)

A. Vincent's infection: condition found in mouth

B. Vincent's angina: the infection found in throat

C. Trench mouth: common term and historical term

D. Ulcerative gingivitis: descriptive term

III. HISTORY

A. Lesions

1. Condition found in throat during Caesar's time
2. Epidemics among soldiers and schools in early nineteenth century
3. Reported by Patterson and Richter in 1891
4. Condition is now recognized and is prevalent in every continent and throughout the United States

B. Organisms

1. Leeuwenhoek in 1683 described the organisms as "snakelike" spirilla
2. W. D. Miller in 1883 described the organisms as normal mouth inhabitants
3. Babes in 1884 confirmed Miller's observation and described the condition in connection with tonsil ulcerations
4. Vincentini in Italy in 1888 described the *Bacillus fusiformis* as an end-product of the *pleomorphic Leptothrix racemosa*
5. Pleomorphism of the Vincent organism was considered from 1893 to 1906
6. Tunniclif in 1905 reported that the spiral and fusiform were two different forms of the same organism. This theory is not now accepted
9. Von Beust in 1905 and 1928 showed that the fusiform bacilli are not bacteria but spores "developed from a parent (*Leptothrix falciformis*) which has affinities with the aquatic fungi"
8. Pleomorphism of fusiform bacillus—whether it is fungus or protozoan is still uncertain See subject of "Microbic Dissociation" discussed in the *Journal of the American Medical Association,* November 22, 1930
9. Gilmer recognized the oral disease in 1906
10. Ehrlich discovered specific spirocheticidal drugs in 1909
11. Vincent's infection spread during and after the World War; or, at least, it has been more frequently recognized and reported since then

C. Association of Lesions and Organisms

1. Etiology of Vincent's infection is *not* scientifically certain: If organisms do not cause the condition they do accompany it
2. Theory that this infectious disease is due to the symbiosis is a valid working hypothesis
3. That organisms appear in symbiosis in throat lesions and hospital gangrene was recognized by Rauchfus in 1893; Plaut, 1894; and Vincent, a Paris physician, in 1896

IV. FATALITIES AND COMPLICATIONS

A. Acute Type:

1. Epidemic; contagious; infectious organisms are probably spray borne
2. Fatalities follow tooth extractions as reported by Mease

   Thompson reports a subsequent brain abscess

   Numerous cases of exacerbations in the mouth and throat (the infection may extend from the mouth to the throat or from the throat to the mouth)

   Fatal case of otogenic meningitis was reported in 1922
3. Symbiosis found in larynx and bronchi in ulceration of lungs; noma; middle ear disease; erosive balanitis and vulvitis
4. Complicates: lesions of syphilis; tuberculosis; anemias; cancer; diphtheria; acute pemphigus

B. Chronic Type:

1. Recently recognized; endemic; organisms may be merely secondary saprophytes
2. Danger of carriers; "flare-ups"; complicates pyorrhea
3. Relationship is unknown to degenerative diseases of obscure origin, such as Hodgkin's

disease, anemias, agranulocytosis, acute leukemia, and other blood and lymph changes

Observation is necessary

4. "Finding the organisms does not necessarily mean the lesion is entirely of this type of infection."—Bloodgood

Early detection is necessary

V. DIFFERENTIAL DIAGNOSIS

A. Correlation of Symptoms and Microscopic Observations:

1. Subjective: pain; patient's reaction to bleeding; salivation; loose teeth; malaise; nausea; dread; headache; chills; lassitude; anorexia; metallic taste; dysphagia; sensitive tongue; painful cervical adenitis; arthralgia
2. Objective: bleeding; salivation; loose teeth; sloughing gingivae; fetid odor to breath; rise in temperature; high pulse rate; often history of sudden onset; craterlike ulcers and gingivae
3. Microscopic Observations: seen under VI

B. Differentiation:

1. Acute form may be confused with diphtheria; syphilis; cancers; tuberculosis; acute pemphigus; metallic stomatitis; streptococcus infections
2. Chronic form may be confused with pyorrhea; diabetes; scurvy; nutritional disturbances; anemias; leukemias; Hodgkin's disease
3. "The identification of a Vincent symbiosis in smears does not by any means prove the condition to be an uncomplicated Vincent's angina."—Stokes

VI. BACTERIOLOGY AND ETIOLOGY

A. Attributed bacteriologic cause: Symbiosis of anaerobic organisms:

1. Spirochetes; nonspecific. *Treponema microdenteum* and *T. macrodenteum; Borrelia vincenti*: snakelike; from 7 to 25 mm. long; from 2 to 5 wavy spirals (Compare *Treponema pallida*)
2. *Fusiformis dentium*: tapering, granular, often curved; pleomorphism; it is uncertain whether the organism is fungal or protozoal; presents the problem of microbic dissociation

B. Predisposing causes:

1. Local: severe caries; "catch-all" dentistry; pericoronal flaps on third molars; neglected mouth hygiene; irregular teeth; infected tonsils
2. Systemic: faulty diet; scurvy; metallic poisoning; fatigue; exposure; syphilis; cancer; diabetes; anemias; Hodgkin's disease

VII. TREATMENT

A. Local infection: variety of organisms present:

1. Bacteria: staphylococci and streptococci; *Bacillus acidophilus*
2. Higher bacteria: leptothrices, molds, and yeasts
3. Spirochetes
4. Protozoa: *Endameba buccalis*

Drugs should be used locally for specific organisms found. Oral prophylaxis should be instituted

B. Saprophytes: caustics, such as silver nitrate and trichloracetic acid, should be avoided

C. Mouth acidity: alkalinization should be carried out with local and systemic treatments

D. Anaerobes: oxygen liberating compounds should be used, such as sodium perborate, hydrogen peroxide, potassium permanganate, potassium chlorate, and chromic acid

E. *Borrelia vincenti* is a spirochete; spirocheticidal drugs should be used:

1. Arsenicals: locally, Fowler's solution (solution of potassium arsenite); neoarsphenamine

   Intravenous injection has toxicity and death rate; effectiveness is doubtful

   An effective treatment is sodium perborate as a mouth wash; thorough prophylaxis; local application of neoarsphenamine
2. Mercurials: mercuric chloride; metaphen; mercurochrome
3. Iodides are more bactericidal than spirocheticidal in action
4. Bismuth deserves trial

principles of medication can be outlined which, if understood and used by dentists, give reasonable assurance of success in the treatment of Vincent's infection. If the future disproves the hypothesis, the outline may have served, nevertheless, to classify drugs and methods that appear most valuable now. It is useful to consider at least five characteristics of Vincent's infection as clues to the use of medicaments:

1. It is a local infection, usually with a variety of organisms present.
2. Saprophytic organisms are present.
3. There is a tendency to mouth acidity.
4. Both the *Borrelia vincenti* and *Fusiformis dentium* are anaerobic.
5. The *Borrelia vincenti* is a "spirochete."

1. *Local Infection—Variety of Organisms Present*—If there is a local infection in which a variety of organisms may contribute to the diseased condition, then the dentist who uses a microscope or any other means to eliminate guesswork is the better able to cope with any given situation. Treatment and prognosis depend upon accurate diagnosis.

In a consideration of the chemotherapy of amebiasis or bacterial infection,[9] as a practical matter, three suggestions are made:

A. In so far as the *Endameba buccalis* and bacteria are factors aggravating the diseased condition, specific amebicidal and bactericidal drugs are valuable. Hence, emetine or arsenicals, or other drugs for amebiasis, and aniline dyes, mercury compounds, phenol, or hyperchlorites for bacterial infection, may aid specific cases.

B. Almost any agent in concentrations as applied locally may have some value as antiseptic substance.

C. Anything that cleanses without undue trauma or irritation has value.

In the treatment of mouth conditions drug therapy not only is aided by but is not entirely effective without oral prophylaxis. My previous conclusions[10] have been confirmed by added experience: "Oral prophylaxis must accompany the use of drugs if our treatment is to be thorough. In the acute cases it is not advisable to scale thoroughly at once. Oftentimes, however, in even the worst cases, the huge chunks of tartar may be removed from the teeth so the drug may reach the tissue." Kolmer[11] says: ". . . It is essential to bring the disinfectant into frequent and intimate contact with the infected tissues along with the surgical removal of necrotic tissues, tartar deposits, etc." In agreement with Kolmer, merely giving mouthwashes and intravenous injections does not eliminate Vincent's infection, as some medical practitioners apparently think. The acute and subjective symptoms may be alleviated, but conditions will often remain in the gum crevices destroying oral tissue with a "markedly focal potential" unless these areas are thoroughly cleansed and the drugs properly applied. "Treatments of *all* cases of Vincent's infection of the nose and throat should include careful oral prophylaxis."[10]

2. *Saprophytic Organisms—Avoid Caustics*—Saprophytic organisms are present in Vincent's infection. Tissue is destroyed and becomes highly sensitive. I do not advocate the use of caustics to destroy more tissue or cause more irritation. Silver nitrate, trichloracetic acid, chromic acid in saturated solution or crystal form are advised by some, but if caustics are used the operator ought to know the percentage strength and use them discriminately. In this connection certain proprietaries cannot be too strenuously condemned. Undoubtedly, the dental trade has a place in the sun, but when a dentist uses M—fluid, with or without the elaborate equipment, does he know he is using 30 per cent trichloracetic acid? Doctor Gordon, secretary to the Council on Dental Therapeutics states in this connection, "While trichloracetic acid is not as great a caustic as sulphuric and hydrochloric acid, its indiscriminate use should be guarded against. The acid caustics because of intense pain, deep penetration and extensive scar formation are not desirable cauterisms. Nitric acid and trichloracetic acid form relatively firm eschars so that their action is more circumscribed and less painful."

3. *Mouth Acidity—Change to Alkaline*—The third characteristic of the disease is the tendency toward mouth acidity. Any alkaline mouthwash, then, is valuable in treatment; or lavage, prophylaxis, or systemic treatment that tends to decrease acidity and develop normal alkalinity in the mouth.

4. *Anaerobes—Use Oxygen-Liberating Compound*—The fourth characteristic is that both the *Borrelia vincenti* and the *Fusiformis dentium* are anaerobic organisms.[7] Best to acquire immediate control of acute conditions is the use of a compound that liberates oxygen. I usually use hydrogen peroxide or sodium perborate. Bloodgood[12] believes that sodium perborate will clear 95 per cent of the cases. As a powder it is irritating to some patients, but usually not as irritating as peroxide. Potassium permanganate, potassium chlorate, and 7 per cent chromic acid are also often used.

The tendency to alkalinity favors sodium perborate. I have not carried a case through on perborate only. Some have objected to sodium perborate because it releases only a small percentage of oxygen. The powder should be placed about the gums while moist with saliva. Effervescence occurs as the saliva mixes with the powder. Patients should be cautioned to hold the powder in the mouth from three to five minutes at a time, and to use the wash every three hours.

Hardgrove[13] makes some claims for oxygen liberation by using chromic acid in crystal form and hydrogen peroxide that will bear investigation. When chromic acid in crystals is applied to tissue the action of a caustic results. Claims are made concerning the virtue of the nascent oxygen. There is no doubt of the nascency, but the tissue is already cauterized, and whether a quick release of oxygen or slow release is the better for gas diffusion into gingival crevices is a question.

5. *Borrelia Is Spirochete—Use Spirocheticidal Drugs*—The fifth and last characteristic of Vincent's infection is that the *Borrelia vincenti* is a spirochete.[14] Clinical experience shows that when Borrelia is destroyed the lesions disappear.[15] Irrespective of the bacteriologic uncertainties, spirocheticidal drugs are effective in the treatment of Vincent's infection. Only compounds of (*A*), iodine, (*B*), mercury, (*C*), arsenic and (*D*), bismuth[9] will be mentioned here.

A. For Vincent's infection, certain Canadian operators continue to use iodine and 10 per cent silver nitrate. They mention that "these agents when used separately are very irritating to the tissues of the mouth; nevertheless, in this combination, a very desirable germicidal action is obtained with the least possible amount of irritation."[7] Greenbaum, working in Kolmer's laboratory (1926), found tincture of iodine had no spirocheticidal effect in a final dilution of 1:50. It ranks high in bactericidal activity.[11]

B. Mercuric chloride, however, was an effective spirocheticide in a dilution of 1:6000.[11] For several years I used mercuric chloride 1:2000 in a 50 per cent hydrogen peroxide (3 per cent) solution and found it effective.[10] It is irritating to some tissues, however, and, although no instances have come to my personal observation, danger of poisoning through swallowing may be present. With alloy fill-

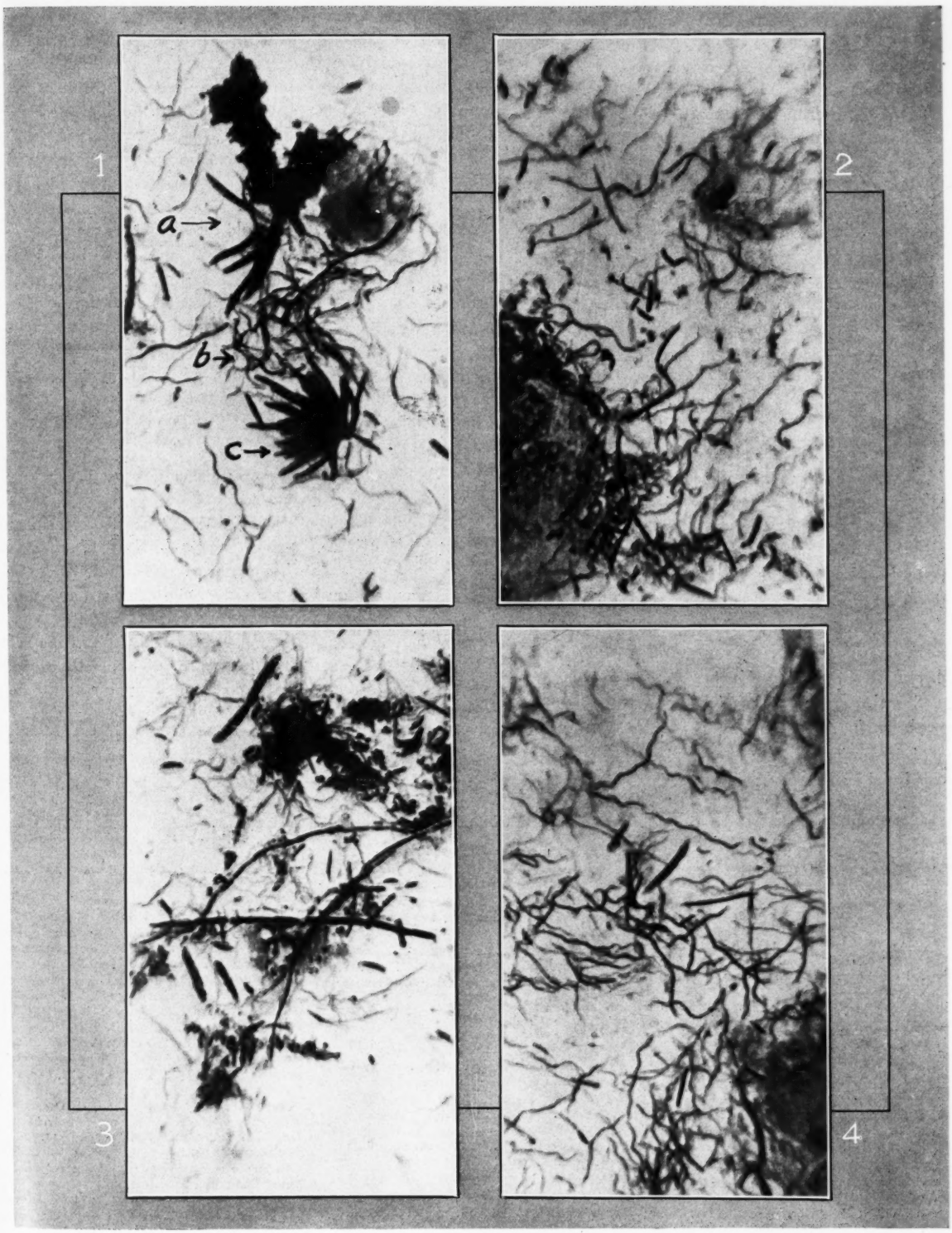

Fig. 1—Tooth scrapings from an old man like Leeuwenhoek's "dirty victim." (a) Metachromatic *B. fusiformis;* (b) long spiral, *Borrelia vincenti;* (c) *B. fusiformis* in so-called sporulation form as described by von Beust. Carbol fuchsin and gentian violet stain.

Fig. 2 (Case 3)—Patient had used sodium perborate intermittently for about a year. Note small size *B. fusiformis* as compared with other illustrations.

Fig. 3—Case of suppurative periodontoclasia, but with Vincent's organisms. Shows "pus cocci," metachromatic fusiform bodies, spirals, and threadlike forms. Patient presented history of diabetic tendency.

Fig. 4—Field presents predominance of spirals with few *B. fusiformis.* Carbol fuchsin and gentian violet stain.

ings in the mouth, it tarnishes the teeth.

Among the recent mercurials, mercurochrome has not been particularly effective in my hands. Metaphen and mercurophen (an organic mercury compound) are favorably reported.[11] Birkhaug found, in an exhaustive study of several chemicals, that metaphen led excessively.[16] While Doctor Birkhaug was careful to use both vegetative and spore-bearing bacteria for his tests, he did not use spirochetes. Greenbaum found the spirocheticidal effect of mercurophen the same as that of mercuric chloride.

In a tabulation summarizing the results of several investigators, reporting the spirocheticidal activity *in vitro* of arsenical, mercurial, soap, and other compounds, Kolmer[11] shows "that the mercurials and to a lesser extent the arsphenamines possess well-defined spirocheticidal activities *in vitro*."

At the present time I am using metaphen in 1:2000 solution as the mercurial and find it effective when used with sodium perborate and neoarsphenamine locally.

C. Investigators now know that blood and tissue extracts increase the spirocheticidal activity of the arsenicals.[11] Excessive drying of the oral tissues, therefore, is unnecessary and may be even disadvantageous when applying the arsenicals locally. I find small rubber polishing cups useful for "pumping" liquids into gum crevices. The neoarsphenamine powder may be used in dextrose solution, in water, in glycerin, or in metaphen.

Physicians are inclined to rely upon the injection of arsphenamine, thinking local treatment merely an adjunct; dentists follow one of two procedures: Some, because of inexperience, timorousness, association with medical groups, or clinical experience, immediately refer their patients for injections; others, when the disease is confined to the mouth, rely upon local treatment, resorting to systemic administration only when the infection attacks the ear, tonsils, or respiratory organs.

In many cases injections are unnecessary. According to Lieutenant-Colonel Rhoades of the Surgeon-General's office, it was tried out during the Great War and discontinued, as it was not found necessary in the cure of the disease. Some clinicians and scientists doubt even its efficacy upon the gingival spirochetes.

It should be noted in this connection that there are now reported numerous cases of syphilitic patients under active arsenic treatment who have developed Vincent's infection.[17] Thus far, however, no difference has been found in the spirochetes in the mouths of patients under tryparsamide or sulpharsphenamine treatment, or in old cases in which the treatment had ceased, and ordinary dirty mouths.[18]

D. The use of other forms of arsenic, and also of bismuth, may be watched with interest.[19] No estimate of relative value can yet be made.[20]

Conclusion

The situation relative to Vincent's infection today may be briefly summarized:

1. The disease is widespread and serious enough in both its acute and chronic forms to warrant the attention of observing clinicians and qualified scientists.

2. There is much, both in the field of pure science and applied medicine, that we do not know about the disease.

3. Nevertheless, there is a working basis for diagnosis, treatment, and prognosis.

(Adapted from *The Journal* of the Minnesota State Dental Association, Vol. 10, July, 1931.)

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PORCELAIN JACKET CROWN TECHNIQUE

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and
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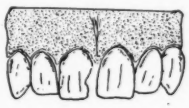
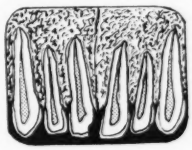
1.

FIRST VISIT 1-10.



Study Model.

2.



Roentgenogram.

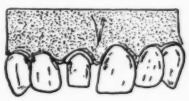
3.

Local Anesthetic Injection.

4.

Distribution of Colors in Shade.

5.

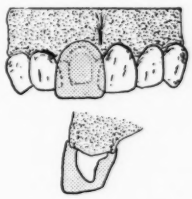


Tooth Prepared.

6.

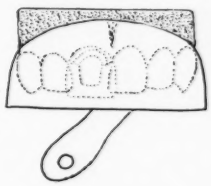
Copper Tube Impression.

7.



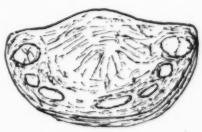
Inlay Wax Impression.

8.



Plaster Impression.

9.



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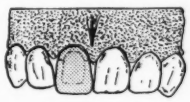


Celluloid Tooth Form.

11. SECOND VISIT 11-13.

Clean Prepared Root.
Test Crown for Fit.
Test Contact Points.
Test Length of Crown.
Test General Contour.
Test Shade of Crown.

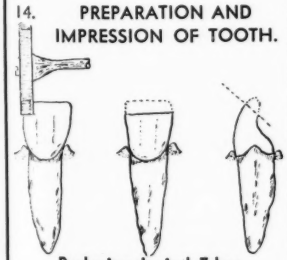
12. FINAL CEMENTATION.

Dry and sterilize preparation. Press home with firm and steady pressure and hold.

13.

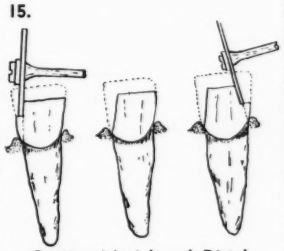
Adjust crown to the correct articulation after cementation.

14. PREPARATION AND IMPRESSION OF TOOTH.



Reducing Incisal Edge.

15.

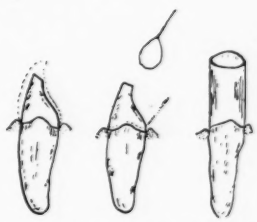


Cutting Mesial and Distal.

16.

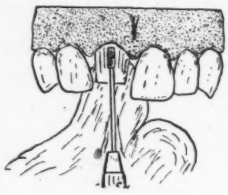
Removing Enamel.

17.



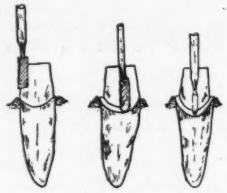
Fitting Wire and Copper Tube.

18.



Starting Shoulder.

19.



Cutting Shoulder.

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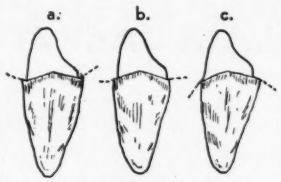
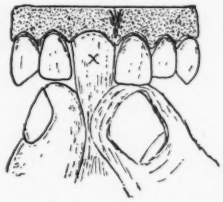


b.—Correct.

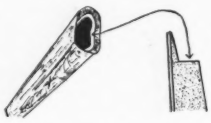
Types of Shoulders.

21.



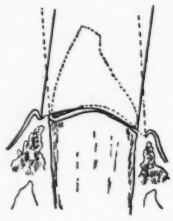
Taking Copper Tube Impression.

22.



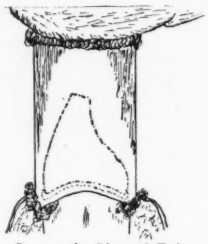
Definite Impression of Shoulder.

23.



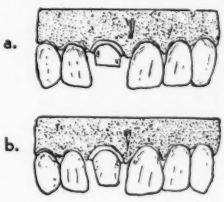
Incorrectly Placed Tube.

24.



Correctly Placed Tube.

25.

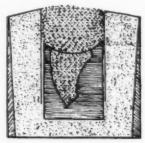


a. Too Short. b. Correct Length.

26.

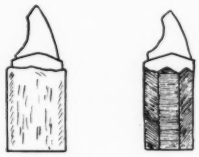
Impression Boxed.

27.



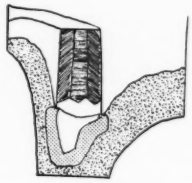
Impression Packed.

28.



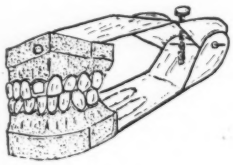
Unfinished and Finished Dies.

29.



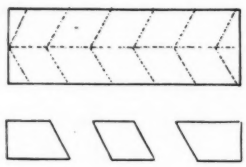
Die Placed in Impression.

30.



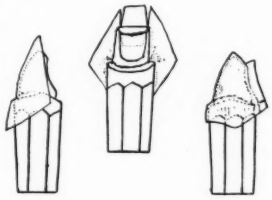
Model Articulated.

31.



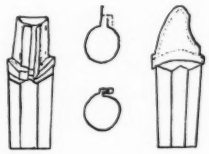
Matrix Platinum.

32.



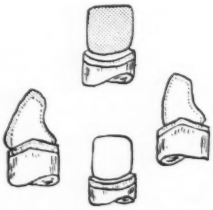
Adapting Matrix to the Die.

33.



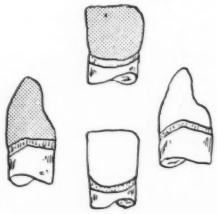
Joint on Lingual of the Die.

34.



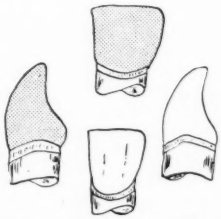
Building and Fusing. 1st Stage.

35.



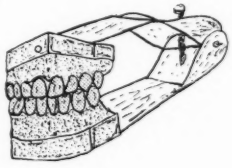
Building and Fusing. 2nd Stage.

36.



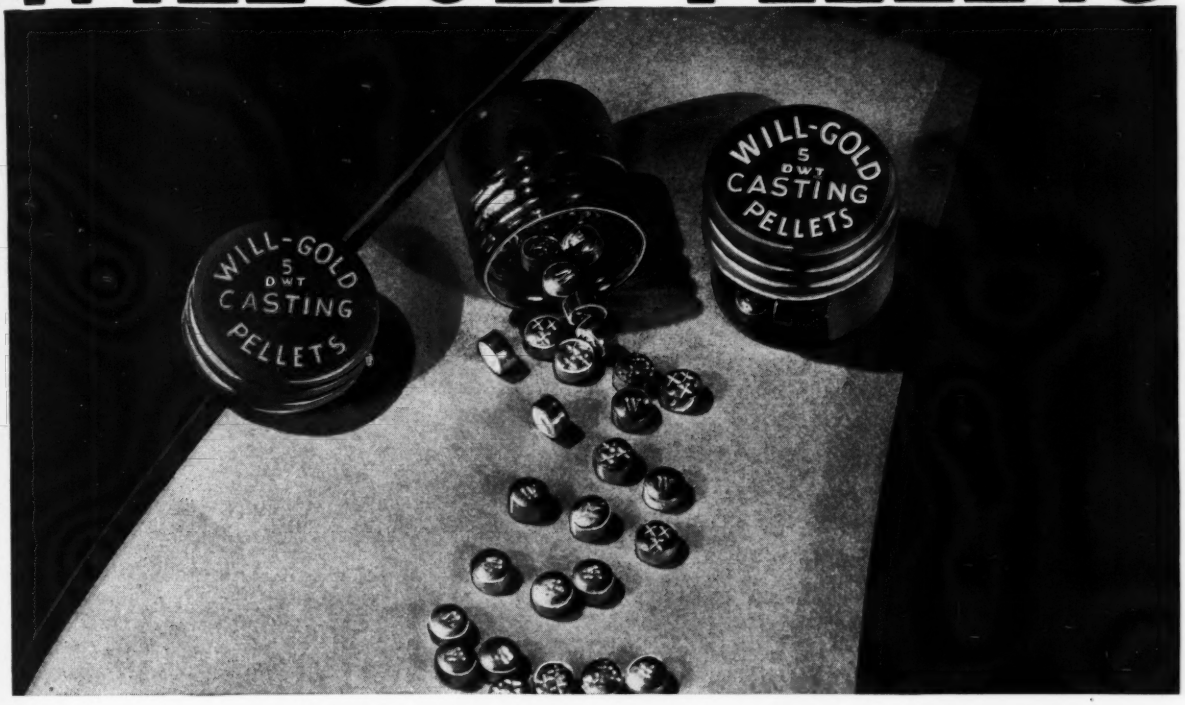
Building and Fusing. 3rd Stage.

37.



Finished Crown on the Articulator.

WILL-GOLD PELLETS



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DENTAL ASSISTANTS AND SECRETARIES

ELSIE GREY

Elsie Grey will be glad to hear from any readers, dental assistants, secretaries, dental hygienists and dentists. Questions are just as welcome as suggestions. It is hoped that this department will provide a free and helpful exchange of thought on new and better methods in dentistry. It is your department and we want you to take the fullest advantage of it. Write to Elsie Grey—she will help you.

Removing Wrinkles from Poorly Laundered Uniforms

Miss Elsie M. Anderson, Brooklyn, New York, suggests that if the laundry does not fold the dentist's white coats correctly, and if the lapels are poorly pressed, the lapels may be drawn tightly across the edge of a closed boiling sterilizer. The steam removes the old crease and the hot metal irons in the new one.

We suggest that this method can also be used to take out creases in the assistant's cap, and in the sleeves or collar of her uniform.

Lysol will immediately remove iodine stains. After the Lysol is applied sponge off with clear water.

Training for Dental Hygienists

Several of our readers have asked how long it takes to become a dental hygienist and what the requirements are to take up a course of training. In the *Journal of the American Dental Hygienists Association,* May, 1932, appears the following: "The entrance requirements of all training schools for hygienists appear to be about the same: graduation from an accredited high school, at the same time requiring credits in specific subjects." Some state laws require two years of high school work; some that the applicant be a full-term graduate; some provide that graduate nurses may take a license examination if they have had three months' training in a school for hygienists. The minimum age limit is 18 years; the maximum is 21, depending on the school. Of the sixteen schools for training, ten give a one-year academic course; four specify two years (academic); one gives eleven months' training; and one makes a second year of training optional.

When Feeding Is Difficult

AS is invariably the case in dental disease or during operative procedure, mastication is difficult or well nigh impossible. At such a time the diet problem often becomes acute, and any advice the dentist can give to his patient is more than welcome.

Why not suggest Ovaltine—The Swiss Food-Drink? It provides "a square meal" in liquid form, and its enticing flavor relieves the monotony of the ordinary liquid or soft diets.

Ovaltine, too, adds important food elements to plain milk, and a cup of Ovaltine is twice as easily digested as milk—because Ovaltine splits up the tough curd of cows' milk into a light, flaky, easily digested coagulum.

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ABOUT OUR CONTRIBUTORS

HAROLD O. BROWN received his D.D.S. in 1913 from the University of Buffalo. He is a member of the A.D.A., New York State Dental Society, Rochester Dental Society, Rochester Dental Society Study Club, and Delta Sigma Delta. Doctor Brown has a general practice, specializing in prosthetics, at 216 Cutler Building, Rochester, New York. Doctor Brown is the author of a book, "Use and Care of Dentures," Sheffield-Fisher, 1931. His first published article appears in this issue.

M. HILLEL FELDMAN, D.D.S., is the author of "Surgical Correction of Alveolar Ridge Irregularities as an Aid to Denture Stability," which was published in the February issue of THE DENTAL DIGEST. Doctor Feldman's biography appeared in the February issue.

FRED ROUS MALLORY, L.D.S. (Royal College of Dental Surgeons of Ontario), D.D.S. (University of Toronto), 1900, was a captain with the Canadian Army Dental Corps (1914-1918). He is an honorary member of the Canadian Dental Association, Fellow of the Royal Society of Medicine, a member of the American Dental Society of London, the American Dental Society of Europe, the British Dental Association, European Orthodontological Society, British Society for the Study of Orthodontics, Fellow of the Zoological Society, a member of the Federation Dentaire Internationale, the British Empire Club, London, The Conservative Club, and The Pilgrims. Doctor Mallory is engaged in the general practice of dentistry at 4 Wimpole Street, W. 1, London, England.

ALAN CUMBRAE ROSE MCLEOD received his D.D.S. at the University of Pennsylvania in 1928; in 1929, his B.Sc. at the University of Toronto, and, in 1930, his L.D.S. at the Royal College of Surgeons, England. Doctor McLeod is a member of the American Dental Society of London, the European Orthodontological Society, the British Dental Association, the Royal Society of Medicine, and the British Society for the Study of Orthodontics. Doctor McLeod is associated with Doctor Mallory in the general practice of dentistry at 4 Wimpole Street, W. 1, London, England.

LLOYD ERNEST MUSBURGER, of 8-10 Nierling Block, Jamestown, North Dakota, has his B.A. (1914) from Fargo College, North Dakota; D.D.S. (1923) from the University of Minnesota, and a Certificate (1919) from the Université de Montpellier, Herault, France. Doctor Musburger is the author of several professional magazine articles, and has a general practice. He is a member of the North Dakota State Dental Association, O. K. U., and Xi Psi Phi. Doctor Musburger was Principal of the Fargo College and Academy from 1914 to 1917; Division Instructor of Automatic Arms from 1917 to 1919, and Student Assistant in Gross Anatomy the summers of 1921 and 1922, at the University of Minnesota.

Who's Who in America gives the following information:

PAUL ROSCOE STILLMAN received his D.D.S. in 1899 from Baltimore College of Dental Surgery. Doctor Stillman was instructor of advanced dentistry at Columbia University from 1916 to 1920; he has been clinical professor of periodontia at the New York University School of Dentistry since 1924; and was postgraduate lecturer on periodontia at Harvard in 1928. Doctor Stillman is co-author with John Oppie McCall of the *Textbook of Clinical Periodontia* (1923), and is the author of an article on periodontia published in 1928 in the *Encyclopaedia Britannica.* Doctor Stillman is a member of the advisory board of the New York City Department of Health; F. A. C. D.; a member of the New York Academy of Dentistry and of the American Academy of Periodontia (former president); member of the A. D. A. (president of the periodontia section in 1920); vice president of the First District Dental Society of New York; member of the International Association of Dental Research; Psi Omega and Omicron Kappa Epsilon; official arbitrator, Arbitration Society of America; president of the section on periodontia of the Seventh International Congress, Philadelphia; member of the Medical Exemption Board, New York, during the World War; captain First Field Hospital, N.Y.N.G.; first lieutenant N.Y.N.G. Doctor Stillman specializes in periodontia at 551 Fifth Avenue, New York.

ERRATUM

An error occurred in the titling of the illustrations in the article *Surgical Trauma of the Mandibular Canal* on page 281 and 282 of the August issue of THE DENTAL DIGEST. The subtitles 1, 2 and 3 should have appeared under illustrations 4, 5 and 6, respectively. Likewise, the subtitles under 4, 5 and 6 should be transposed to illustrations 1, 2 and 3.

We regret this error and will gladly send new copies of titles to any readers who wish to paste them in their magazines in correct sequence. Write to THE DENTAL DIGEST, 1125 Wolfendale Street, Pittsburgh, Pa.